POLITECNICO DI MILANO

Scuola di Ingegneria Industriale e dell'Informazione

Master of Science in

Management and Industrial Engineering

An analysis of Supply Chain Finance in Europe: unexploited potential and future improvements

Supervisors: Prof. Alessandro Perego
Prof. Michael Henke

Co-supervisors: Dott. Luca Mattia Gelsomino
Dott. Axel Shulte

Master graduation thesis by:

Marco ASCARI
Student Id: 796582

Academic year: 2014/2015

Contents

List of figures

List of tables

List of abbreviations

CCC: Cash-to-Cash Cycle
CEO: Chief Executive Officer
CPFR: Collaborative Planning, Forecasting and Replenishment
CS: Consignment Stock
CVC: Corporate Venture Capital
DCF: Discounted Cash Flow
LSP: Logistic Service Provider
NWC: Net Working Capital
PMI: Piccole-Medie Imprese
RWA: Risk Weighted Average
SC: Supply Chain
SCC: Supply Chain Council
SCF: Supply Chain Finance
SCM: Supply Chain Management
SMEs: Small-Medium Enterprises
VMI: Vendor Managed Inventory
WACC: Weighted Average Cost of Capital

Acknowledgments

I would like to thank very much the supervisor of the thesis, Prof. Alessandro Perego, for giving me the opportunity to carry out this work abroad in collaboration with the Fraunhofer Institut IML in Germany, Dortmund.
He made it possible to me to study a very interesting and innovative topic, provide an international featuring to my research, spend a beautiful time and build experience in another country.

I would also like to thank the co-supervisor of the thesis, Dott. Luca Mattia Gelsomino, for his time, availability and valuable contributions; it would not have been possible to achieve the same results without his precious help.

Special thanks as well to my foreign referents, Prof. Michael Henke and Doc. Axel Shulte, and to my dear supervisors at Fraunhofer IML, Mehmet Sercan and Natalia Broza, which supported me throughout all the development of the activities and made it fantastic my period abroad.

Thanks a lot to all the special people of my life, for their advices, affection, friendship, and to have always been my side in good and bad times.

Finally, I will never thank enough my family for their priceless support and love and for believing in me unconditionally during all my life.

Abstract

In the last decades the global economic and financial environment gradually evolved reaching an enormous complexity and it is increasingly difficult for the firms to satisfy their customers and to be successful; these considerations acquire even more importance considering the financial crisis of 2008 and the debt sovereign crisis of 2010.

Collaborative supply chain solutions regarding the information, material and logistic flows are already commonly implemented, but it is not sufficient anymore to compete since finance has recently taken a too much important role; SCF is a set of non-canonical financing solutions aimed to reduce the gap between the physical and the financial supply chain and based on the exploitation of the relationships between the supply chain partners.

This work studies the current state of SCF in Europe and its future developments in view of the current economic and financial situation; the idea is to analyze the unexploited potential of this topic and to identify possible improvements, in order to extend its benefits to a wider range of actors.

Firstly, the governmental experiences of SCF are taken in consideration and it is studied why the support of public sector is critical and what is happening in Europe.

Then, the focus is addressed to the specific solutions for the SMEs, since this category is really important in Europe and is looking for alternative sources of financing, but at the same time is hardly reached by SCF.

Finally, the last insight considers the multi-tier SCF solutions, in order to provide more flexible and cheaper financing also to the relevant players situated beyond the first level of the supply chain.

Executive summary

Introduction

The current financial and economic situation is making increasingly necessary the collaboration between all the most critical supply chain partners, since it is no longer sufficient to approach the business in a individual logic; in addition, the recent financial and liquidity problems are still affecting almost all countries in the world.
This situation is asking to extend the collaborative approach also to finance in order to introduce innovative solutions, reducing the gap between the physical and the financial supply chain; SCF is a set of non-canonical financial schemes based on the exploitation of the relationships between the supply chain partners and aimed to build a win-win situation for all the actors involved.
SCF is a quite recent discipline and it is not well structured yet, since there are no universally accepted terminologies and classifications of its tools; moreover, its potential is strongly affected by the features and conditions of the different countries.
In fact, the future developments of SCF depend on the number of players able to benefit from these solutions and their relevance in the economic system.

Objectives

The objectives of this work are to study the status of SCF in Europe, identify its unexploited potential and future developments in view of the financial and economic context and present possible solutions adopted at European level.

RQ 1. **What is the current state of SCF in Europe?**

The analysis focuses on the most relevant European countries and takes in consideration the benefits, opportunities and challenges for the actors potentially involved in these financing schemes; moreover it is reported an overview of the main solutions available on the market and some possible classifications.

RQ 2. **What are the future developments of SCF in view of the current financial and economic context in Europe?**

Considering the peculiarities of the European markets and the current financial situation, the investigation focuses on the next steps of SCF in relation to its unexploited potential and to the conditions of the weakest subjects in the economic system.

RQ 3. **What are possible solutions in relation to these future developments and the most relevant players in that view?**

For each future development it is interesting to understand which players could have a critical supportive role and why and, in that view, which solutions could be implemented; the analysis reports theoretical implications and some small case studies at European level.

Methodology

The first step of the work is the literature analysis, which represents the theoretical basis of the research context; then, a series of secondary sources and technical documents mostly provided by the universities of the SCF Community were taken in consideration. This research was useful to study the concepts and the meanings of SCF and to understand the potential of its solutions for the main subjects in the economic system.

Afterwards, in order to restrict the setting of the empirical analysis, the focus was addressed to the main European countries; in view of the current economic and financial situation, the most interesting future developments of SCF were identified and investigated.

Finally, further information was collected through a series of semi-structured interviews with domain experts; these sources, integrated with all the others, were used to develop small case studies in order to provide practical experience about SCF and its future developments in Europe.

The following figure (figure 1) is aimed to synthesize the conceptual schemes of this work, from the different sources of information to the main theoretical and practical results achieved; it represents the research framework:

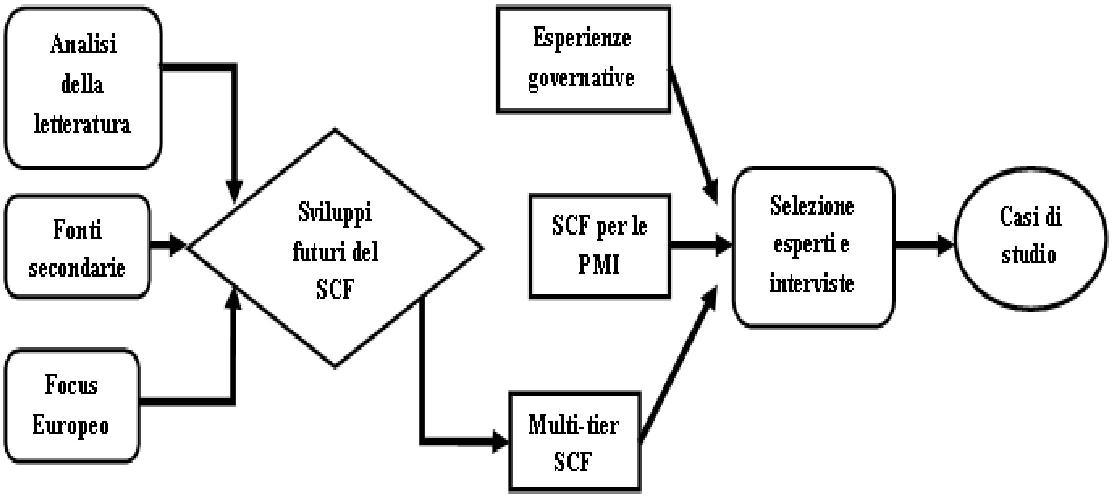

Figure 1: The research framework.

Literature analysis

The literature review provides the theoretical basis of this work, and consists in the critical analysis of the national and international contributions taken in consideration for the research.

Two very short strands consider the concepts of supply chain and supply chain management, but of course the focus is on SCF and its solutions.

The first paragraphs include the main definitions and frameworks of this discipline, its benefits and the investments necessary, the opportunities and the challenges, the players potentially interested, the levers and the dimensions.

The central part, which is the focus of the literature analysis, regards the relevant classifications of SCF solutions; moreover, the most interesting traditional and innovative practices are described in detail.

In relation to the innovative schemes, a final paragraph focuses on the SCF technology.

As reported in the following figure (figure 2), different typologies of contributions have been taken in account:

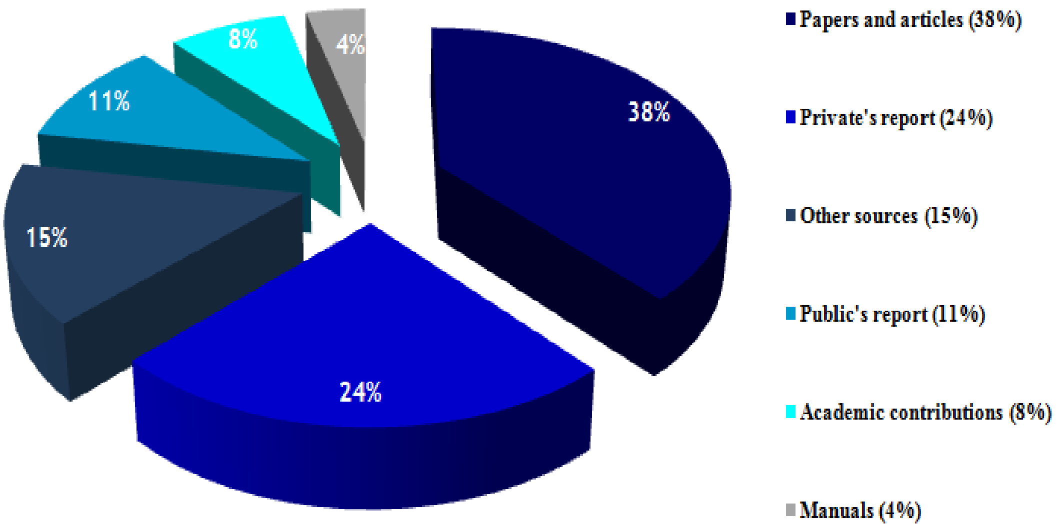

Figure 2: The sources of this work organized per categories.

Current state of SCF in Europe

Through a detailed analysis of all the information available, it was possible to clarify the most important concepts of SCF and to have a general overview of what is happening in the main countries, with a European focus; in particular, this second strand focuses on the level of knowledge and implementation of this discipline, setting up a good starting point for the identification of the possible improvements and future developments.

It has been done a review of the different meanings and interpretations of SCF and its theoretical and practical implications and ways of reasoning; the focus was also on the players potentially involved or affected by this set of solutions and basically four main categories were identified, together with their related benefits and opportunities: buying companies, suppliers, financial institutions and service providers.

In addition, three significant classifications of solutions were identified, each based on a different interpretation of the term SCF:

- Buyer centric vs seller centric solutions: in this case SCF is seen as a set of alternative financing programs driven by a buying focal company and addressed to its suppliers, which are able to leverage the credit standing of the buyer in order to receive cheaper and more flexible financing. At the same time, the buyer and a group of investors can achieve several benefits;

- Post-shipment vs pre-shipment solutions: in this case SCF has a narrow interpretation and it is considered a high-technological evolution of reverse factoring involving a wider range of actors and structured on web-based electronic multi-task platforms;

- Traditional vs innovative vs collaborative solutions: SCF is seen as the entire group of working capital financing solutions and supply chain collaborative practices.

Future developments of SCF in Europe

This part is the central focus of the work and is aimed to identify the possible improvements and future developments of SCF which could enforce its potential across the several players who are asking for these solutions; the analysis takes in consideration the current financial and economic situation in Europe, which of course has a strong influence on these schemes, in terms of effectiveness, potential, difficulties of implementation and constraints.

The first insight refers to the governmental experiences of SCF, in which the public authorities are strongly engaged in sponsoring and supporting these schemes; in fact, there are several reasons for which a government should intervene.

In Europe SCF is already known, but a lot of subjects are not completely aware of its real potential and there is no a lot of information available; high investments in cash and time are required to be successful and only the big corporations are able to sustain alone this burden, while the SMEs and other weak actors in the economic system need support.

At the same time SCF offers a lot of interesting benefits for a government, since it is an alternative source of financing and a win-win situation for the players involved; investments, growth, national employment and innovation are positively influenced by these solutions, which can also provide new business opportunities for a wide range of actors, as SMEs, starts-up, banks, service providers.

In addition, these practices are also aimed to strengthen the relationships between the supply chain members, to reduce the global risk and to guarantee a larger sustainability of the business in the long period.

The empirical analysis was addressed to produce a general overview of what is happening in Europe and in the most important countries in the world; several different public programs were identified and it was possible to classify the different actions, depending on the country and on the level of public engagement.

As reported in the related chapter, UK can be assumed as benchmark considering the variety of interventions implemented, in terms of sponsoring and provision of information, engagement of relevant players, regulations and directives, direct and indirect financing, public-led schemes; also in other countries there are interesting projects and some significant results are reported in the summarizing tables 4.2, 4.3, 4.4.

Another possibility to improve the potential of SCF in Europe relies on making available its instruments for the SMEs; this category of firms is still suffering from the effects of the two recent crisis, in particular in terms of working capital financing and fix capital financing constraints, which in other words means lack of liquidity and limited investment alternatives.

In addition, their dimension makes it difficult to get assessed in term of risk and future potential and, at the same time, the lack of know-how, interest and financial education reduces the possibility to apply for SCF.

On the other hand, SMEs have a critical role in the European system, since their performances strongly affect the total amount of investments, the economic growth and the rates of innovation and employment.

The importance of ad-hoc SCF solutions for the SMEs is also underlined by the very few alternatives of financing mainly based on the bank loan system, which unfortunately is still suffering from the credit crunch; moreover, the situation is worsened by the exorbitant and excessive difference between the SMEs' interest rates and those of the big corporations and by the increasing delays in payments of their clients.

Finally, the SMEs are in general very different in terms of structure and processes; this lack of standardization makes more difficult the information management necessary to implement SCF solutions, and it implies high transaction costs.
For all these reasons, SCF for SMEs has to be enhanced and in some European countries the most relevant actors are moving in this direction.
The governments should leverage its large availability of funds and strong decisional power to implement direct and indirect actions addressed to spread knowledge and information, regulate and simplify, fund and lead public schemes.
The focal companies have to use their bargaining power to engage the strategic suppliers and to establish agreements with financial institutions and service providers; these corporations should lead their supply chains, launch SCF schemes and share the best practices.
Other interesting players are the SCF service providers; leveraging their role of connectors between the several actors of the supply chain, it could be a great opportunity for them to develop more flexible technological solutions addressed to a wider range of subjects or ad-hoc instruments for the weaker subjects.
In this work it is reported an impressive project of SCF for the SMEs developed in the Netherlands in collaboration between the government, the Windesheim university and the industry sectors; in addition it has been taken in consideration the business model of two service providers in Europe specialized in SCF for the SMEs.
The last future development which could improve the potential of SCF is the extension of its instruments beyond the suppliers situated at the first tier of the supply chain.
Since the economic system is getting more and more complex is very important to have a complete vision of the entire network and to look over the first levels; SCF solutions in fact hardly reach the strategic actors beyond the first tier of the supply chain.
It is necessary a different approach, based on more visibility and transparency over all the tiers; the engagement and the formation of the multi-tier strategic players is the next step to make clear the benefits of these programs.
Of course an adequate risk management strategy is required, since the risks are higher over the upstream levels of the supply chain.
A focal company should map properly its network and evaluate its supplier base, in order to reduce the risk and select the most relevant suppliers; in addition the suppliers

have to be formed and engaged and it is necessary to make partnerships with banks or service providers in order to develop ad-hoc solutions.

If similar projects are implemented successfully, it is possible to strengthen the relationships between the strategic partners and to fully exploit the potential of the entire supply chain; moreover, the business can gain sustainability in the long period.

On the other hand, also the smaller and upstream suppliers can benefit from SCF, without any additional costs and risks.

Of course some requirements and constraints have to be taken in consideration: the suppliers should be strategic and with a strong and direct relationship with the focal company and their purchasing expenditure should be greater than a minimum pre-established threshold, in order to make convenient the solution also for the buyer.

At the same time the supplier should have few financing opportunities and suffer from liquidity problems and its cost of capital has to be higher than the focal company's one; otherwise it would not be convenient applying for the scheme.

In this work it is reported an interesting project of Philips, which is developing a solution of multi-tier SCF with its more strategic suppliers.

Case studies

As regards the governmental experiences, it was analyzed the business model of an electronic early payments platform, Urica, funded by the British government; moreover it was taken in consideration a public solution of SCF directly managed by the National Health System Agency in England.

Referring to SCF for the SMEs, the focus was on an innovative project, Promise-to-pay Engine, conducted in the Netherlands and involving the government, focal companies, universities and financial institutions; then, two service providers specialized in SCF for SMEs were taken in consideration, Oxygen Finance (UK) and Taulia (Germany).

Finally, the last case study was based on Philips, which is developing an interesting new program of multi-tier SCF in order to involve all the strategic suppliers of the supply chain and to reach a more sustainable growth in the long period.

The following table (table 1) summaries the case studies of this work:

TREND	CASE STUDIES	COUNTRIES	INTERVIEWS
Governmental experiences	**Urica**: web-based electronic early payments platform funded by the British government and other investors. Solutions addressed to all SMEs suppliers, especially exporters, for which is possible to assess a rating. The discount rate fluctuates around the 2% of the invoice nominal value, depending on the rating and the early payment timing. No additional costs and risks fo the buyers.	UK	1) A board member of SCF community from Cranfield University. 2) Global Network Development Director of Urica. 3) Project manager of SCF for SMEs from the Dutch Ministry of Economic Affairs. 4) Managing director of Taulia Germany. 5) CEO of Oxigen Finance. 6) Philips´ employee in the Procurement Finance department, developing a thesis on SCF. 7) Philips´ employee in the Procurement Finance Departement focusing on the Multi-tier SCF project.
	National Health System: public SCF scheme in which the British government, thorugh the NHSBSA, plays the role of focal company in the community pharmacies´ supply chain. The suppliers are funded by CityBank with a convenient rate, based on the credit risk of the public authority (monthly 0,6% of the invoice nominal value). The program has no entry and exit costs and offers also the opportunity to get early payments up to a minimum of 7 days after the approval of invoices.	UK	
SCF for SMEs	**Promise-to-pay Engine**: Dutch project for an indipendent SCF finance entity in collaboration between the government, Windesheim university, financial institutions and focal companies. The aims of this entity are to sponsor SCF and spread its knowledge, to act as a single interface between the buyers and the suppliers, to facilitate the collection of funds and to function like a chamber of compensation in order to manage the financial flows in the best way. The main financial goal would be to unloack a volume of €5 billions within the end of 2018.	Netherlands	
	Taulia: technology provider for supplier financing, leader in USA,UK, and Germany. It offers SCF, Dynamic Discounting and a new solution combining the advantagies of the previous two. The buyers can fund these programs on their own or using the capability of third parties. The competitive advantages are the flexibility of the solutions, the availability also for the SMEs, the possibility to integrate the instruments in ERP systems of the firms and to syncronize in real time the platform, the possibility to define the discount rate through a bid-ask mechanism between buyers and suppliers.	Germany	
	Oxygen Finance: early payments technology platform helping buyers and public authorities to accelerate and automate suppliers' payments. The solutions are available for everybody and no investments are required since the provider is responsible for all the aspects of the project. No third parties are included, peer-to-peer solutions ad-hoc for the clients, Pay-for-performance model and efficiency improvements guaranteed.	UK	
Multi-tier SCF	**Philips**: Multi-tier SCF project in phase of development with the most strategic suppliers. The aim is to support these subjects in order to achieve a larger sustainability of the business in the long period and to enforce the relationships along all the supply chain. No additional costs or risks for the suppliers, significant investments for Philips and no benefits in the short period. Important screening of suppliers: direct relationship buyer-Tier2 suppliers, minimum of procurement expenditure, higher suppliers' interest rate, suppliers' liquidity problems. The solution involves a bank, which decides the interest rate within a pre-established range, spefic technology developed by the bank or a service provider.	Netherlands	

Table 1: summary of the case studies.

Limitations and future developments

SCF is a complex topic and, at the same time, a relatively new field of application; consequently there are still several steps to be completed and a lot of aspects to be studied in details, especially considering that the potential of these schemes is strongly affected by the economic and financial context, which is continuously evolving.

Moreover, the possibility to implement similar solutions depends on the particular features and conditions of the actors involved, which for definition are different from a country to another.

Therefore it could be useful to develop more detailed analysis focused on a single country, or a group of very similar countries, since there would be the possibility to obtain more specific implications and to reduce the risk of generalizing too much.

Another interesting consideration is about the terminology of SCF; since it is a recent topic, there is no a universally accepted vocabulary yet.

As studied in the literature analysis, there are a lot of different definitions of SCF and several interpretations of this term; consequently, there are also different opinions about the solutions to include in this category and some different classifications.

In that view, in order to better clarify the concept of SCF and to clearly analyze its potential, it should be important to provide an official terminology about these schemes, universally shared and accepted at international level.

Finally, this work is mainly theoretical since its central focus is the future of SCF; this topic is gaining interest in the most advanced countries and, as illustrated before, the more audacious players are starting to develop some interesting projects.

Of course, this is just the beginning and consequently there are no a lot of practical evidences or numerical indications; this is because the projects are expensive and in general the quantitative information are confidential.

Therefore, interesting future developments in this field of application could be addressed to realize more specific studies reporting quantitative evidences about the benefits and the investments necessary for the main players involved in SCF schemes.

Sommario

Introduzione

L'attuale contesto economico-finanziario sta rendendo sempre più necessario sviluppare forme collaborative di interazione tra i partner di filiera più rilevanti, dal momento che un approccio individualistico non è più sufficiente per avere successo; inoltre, quasi tutti i paesi sono ancora tormentati dagli effetti negativi delle due recenti crisi finanziarie.
Questa situazione spinge ad estendere l'approccio collaborativo anche al mondo della finanza, in modo tale da introdurre soluzioni innovative che possano ridurre il gap tra la supply chain fisica e quella finanziaria; il SCF è un insieme di schemi non tradizionali di finanziamento basati sullo sfruttamento del legame tra i partner di filiera e che mirano a costruire una situazione conveniente e vincente per tutti gli attori coinvolti.
Il SCF è un tema abbastanza recente e non ancora bene strutturato, dal momento che non esiste una terminologia universalmente condivisa o classificazioni ufficiali delle varie soluzioni; inoltre, il suo potenziale è fortemente influenzato dalle caratteristiche e dalle condizioni dei diversi paesi.
Gli sviluppi futuri del SCF dipendono infatti anche dal numero di soggetti che possono accedere ai vari strumenti e dalla loro rilevanza per il sistema economico.

Obiettivi

Gli obiettivi di questo lavoro sono di studiare lo stato attuale del SCF in Europa, identificare il suo potenziale non sfruttato e i suoi sviluppi futuri alla luce del contesto economico-finanziario e proporre possibili soluzioni adottate al livello Europeo.

DdR 1. **Qual è lo stato attuale del SCF in Europa?**

L'analisi si focalizza sui più rilevanti paesi Europei e prende in considerazione i benefici, le opportunità e le sfide per gli attori potenzialmente coinvolti in questi schemi di finanziamento; è stata inoltre fatta una panoramica generale delle soluzioni disponibili sul mercato e sono state proposte alcune possibili classificazioni.

DdR 2. **Quali sono gli sviluppi futuri del SCF alla luce dell'attuale contesto economico-finanziario Europeo?**

Considerando le caratteristiche dei mercati Europei e l'attuale situazione finanziaria, l'analisi si focalizza sugli step futuri del SCF in relazione al suo potenziale non ancora sfruttato e alle condizioni dei soggetti più deboli del sistema economico.

RQ 3. **A quali soluzioni potrebbero portare questi sviluppi futuri e quali sono gli attori più rilevanti in quest'ottica?**

Per ogni sviluppo futuro è interessante capire quali attori potrebbero avere un ruolo di supporto e, alla luce di ciò, quali soluzioni potrebbero essere implementate; l'analisi empirica riporta implicazioni teoriche e piccoli casi di studi a livello Europeo.

Metodologia

La prima fase del lavoro ha riguardato l'analisi della letteratura, la quale rappresenta la base teorica del contesto di ricerca; successivamente sono state considerate fonti secondarie e documenti maggiormente tecnici messi a disposizione prevalentemente dalle università della SCF Community. Questa parte iniziale è stata utile per studiare i concetti principali e i significati del SCF e per capire il potenziale delle sue soluzioni per i vari soggetti del sistema economico.

In seguito, il focus è stato indirizzato verso i principali paesi Europei in modo da limitare l'ampiezza dell'analisi empirica; considerando l'attuale situazione economico-finanziaria sono quindi stati identificati e studiati i possibili sviluppi futuri del SCF.

Infine, ulteriori informazioni sono state raccolte tramite interviste semi-strutturate con esperti in ambito SCF; queste fonti sono state integrate con tutte le altre e sono state utilizzate per costruire piccoli casi di studio a livello Europeo per ognuno dei trend analizzati, in modo tale da fornire esperienza ed implicazioni pratiche.

La figura sotto riportata (figura 3) cerca di sintetizzare gli schemi concettuali della tesi, partendo dalle fonti di informazione fino ad arrivare alle principali evidenze teoriche ed empiriche che sono state ottenute; essa rappresenta la struttura del contesto di ricerca.

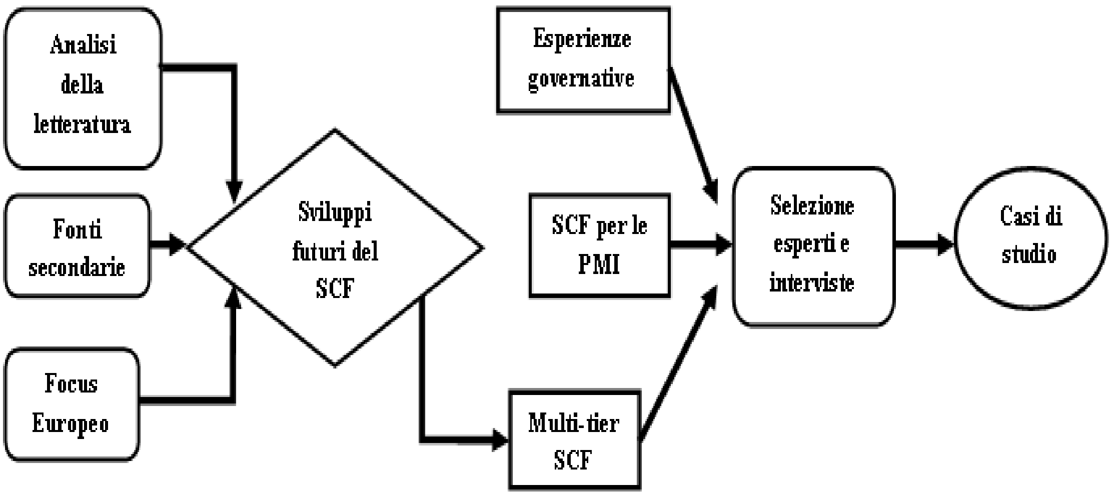

Figura 3: la struttura del contesto di ricerca.

Analisi della letteratura

L'analisi della letteratura rappresenta il fondamento teorico del lavoro e si basa sull'analisi critica di tutti i contributi a livello nazionale ed internazionale che sono stati presi in considerazione; due primi filoni affrontano brevemente i temi della supply chain e del supply chain management, ma ovviamente il focus di questo capitolo è rivolto al SCF e alla sue soluzioni.

I primi paragrafi trattano le principali definizioni e i possibili framework di questa disciplina, i suoi benefici e gli investimenti richiesti, le opportunità e le sfide, i soggetti potenzialmente interessati, le leve e le dimensioni.

La parte più rilevante dell'analisi è quella centrale, che propone alcune rilevanti classificazioni delle varie soluzioni; sono inoltre descritti in dettaglio i più interessanti strumenti tradizionali e pratiche innovative.

In relazione a quest'ultimi schemi, un ultimo paragrafo è dedicato alla tecnologia.

Come illustrato nella seguente figura (figura 4), sono state considerate diverse tipologie di contributi:

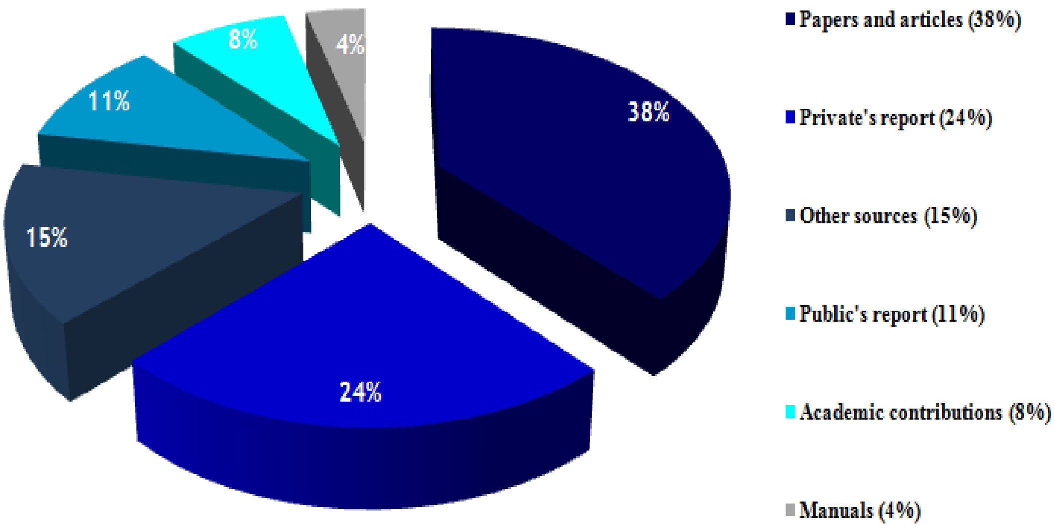

Figura 4: le fonti informative divise per categoria.

Stato attuale del SCF in Europa

Dopo aver analizzato tutte le informazioni disponibili, è stato possibile fare chiarezza sui più importanti concetti del SCF e avere una panoramica generale di quello che sta succedendo nei principali paesi Europei; in particolare questa seconda parte si concentra sul livello di conoscenza ed implementazione di queste disciplina, e rappresenta un buon punto di partenza per la successiva identificazione dei suoi sviluppi futuri.

E' stata fatta una rassegna dei differenti significati e interpretazioni del SCF e delle sue implicazioni teoriche e pratiche; si è cercato di capire quali potessero essere i soggetti direttamente o indirettamente coinvolti in queste soluzioni e sono state individuate quattro principali categorie, insieme con i relativi benefici ed opportunità: buying companies, fornitori, istituzioni finanziarie e service providers.

Sono inoltre state proposte tre significative classificazioni dei vari strumenti, ognuna basata su differenti interpretazioni del termine SCF:

- Soluzioni buyer centric vs seller centric: in questo caso il SCF è visto come un insieme di programmi alternativi di finanziamento guidati da una buying focal company e rivolti ai suoi fornitori, i quali possono sfruttare lo standing creditizio del buyer ed ottenere finanziamenti più flessibili e a basso costo. Allo stesso modo, il buyer e il gruppo finanziatore ottengono una serie di altri interessanti benefici;

- Soluzioni post-shipment vs pre-shipment: in questo caso il SCF ha un significato più ristretto ed è considerato un'evoluzione altamente tecnologica del reverse factoring, che coinvolge un numero molto maggiore di attori e si basa in genere su piattaforme elettroniche web-based multifunzionali;

- Soluzioni tradizionali vs innovative vs collaborative: il SCF è visto come l'intero gruppo di strumenti di finanziamento del capitale circolante e di soluzioni collaborative di filiera.

Sviluppi futuri del SCF in Europa

Questa parte rappresenta il cuore del lavoro di tesi ed è rivolta a identificare possibili miglioramenti e sviluppi futuri del SCF che potrebbero rafforzare il suo potenziale per i soggetti che necessitano dei suoi strumenti; l'analisi prende in considerazione l'attuale situazione economico-finanziaria Europea, la quale ha una forte influenza su questi schemi in termini di efficacia, potenziale, vincoli e difficoltà di realizzazione.
Il primo approfondimento riguarda le esperienze governative di SCF, nelle quali le autorità pubbliche sono fortemente coinvolte nel sponsorizzare e supportare in vario modo questi strumenti; ci sono infatti davvero moltissime ragioni per le quali un governo dovrebbe intervenire in questo senso.
In Europa il SCF è già abbastanza conosciuto, ma molti soggetti non sono ancora consapevoli del suo potenziale e non ci sono moltissime informazioni disponibili; simili strumenti richiedono elevati investimenti in tempo e denaro per funzionare bene e solo le grandi aziende sono in grado di sostenere da sole un simile sforzo, mentre le PMI e gli attori più deboli del sistema economico devono essere supportati.
D'altra parte il SCF offre anche interessanti benefici ai governi, dal momento che rappresenta un'alternativa fonte di finanziamento ed è in grado di creare una situazione

conveniente per tutti; investimenti, crescita, occupazione ed innovazione sono influenzati positivamente da queste soluzioni, le quali possono anche fornire nuove opportunità di business per PMI, starts-up, banche e service providers. Inoltre questi strumenti permettono di rafforzare le relazioni di filiera, ridurre il rischio globale e garantire una maggiore sostenibilità delle attività nel lungo termine. L'analisi empirica ha prodotto una panoramica generale di quello che sta accadendo in Europa e nei più importanti paesi del mondo; è stato possibile individuare molti diversi programmi pubblici e classificare le differenti azioni in base al livello di coinvolgimento del governo e al paese d'origine.

Come riportato nel capitolo relativo, il Regno Unito può essere assunto come benchmark, e questo è dovuto alla varietà di interventi messi in pratica in termini di sponsorizzazione, diffusione di conoscenza e informazioni, coinvolgimento di soggetti rilevanti, norme e regolamentazioni, finanziamento diretto e indiretto, schemi pubblici di SCF; anche in altri paesi ci sono progetti interessanti e i risultati ottenuti sono riportati nelle tabelle riassuntive 4.2, 4.3, 4.4.

Un'altra possibilità per migliorare il potenziale del SCF in Europa si basa sull'estensione dei suoi strumenti alle PMI; questa categoria di imprese sta ha ancora soffrendo gli effetti negativi delle due recenti crisi finanziarie, in particolare in termini di vincoli di finanziamento del capitale circolante e fisso, che rispettivamente comportano mancanza di liquidità e pochi investimenti.

Inoltre la loro dimensione rende più difficile la valutazione del rischio e del potenziale futuro e, allo stesso tempo, la mancanza di conoscenza, interesse ed educazione finanziaria reduce la possibilità di accedere a schemi di SCF.

Bisogna inoltre considerare che le PMI hanno un peso davvero rilevante in Europa, dal momento che le loro prestazioni influenzano fortemente il livello degli investimenti, la crescita economica, il tasso di innovazione e di occupazione.

L'importanza di soluzioni ad-hoc per le PMI è sottolineata anche dalle poche alternative di finanziamento basate quasi esclusivamente sul debito bancario, che da qualche anno è fortemente limitato; la situazione è aggravata dalla eccessiva differenza tra i tassi di interesse delle piccole imprese e quelli delle grandi corporation e dai ritardi nei pagamenti in continuo aumento.

Inoltre le piccole aziende sono molto diverse in termini di struttura e processi; questa mancanza di standardizzazione rende più difficile lo scambio informativo necessario per implementare soluzioni di SCF e questo comporta alti costi di transazione.
Per tutte queste ragioni è fondamentale rafforzare il SCF per le PMI, e alcuni paesi Europei stanno cominciando a muoversi in questa direzione.
I governi dovrebbero sfruttare la grande disponibilità di fondi e il forte potere decisionale per realizzare interventi diretti e indiretti mirati a diffondere conoscenza ed informazioni riguardo a questo tema, introdurre norme favorevoli, finanziare o realizzare schemi pubblici di questo tipo.
Le focal companies dovrebbero sfruttare il loro potere contrattuale per coinvolgere i fornitori strategici e siglare accordi di partnership con istituzioni finanziarie e provider di tecnologia; in questo modo sarebbe più facile esercitare il proprio ruolo di leader di filiera, lanciare soluzioni di SCF e condividere le best practice.
Altri operatori interessanti sono i provider di SCF e tecnologia; facendo leva sul loro ruolo di connettori tra i partner di filiera, essi potrebbero cogliere nuove opportunità di business sviluppando soluzioni tecnologiche più flessibili rivolte a un'ampia gamma di soggetti, oppure introducendo strumenti ad-hoc per chi è più in difficoltà.
L'ultimo sviluppo futuro del SCF che è stato analizzato riguarda l'estensione dei suoi strumenti ai fornitori situati a monte del Tier 1 rispetto alla focal company.
Dal momento che il sistema economico sta diventando sempre più complesso, è fondamentale avere una visione complessiva di tutta la supply chain e guardare oltre i primi livelli; il SCF infatti difficilmente raggiunge i fornitori strategici oltre il Tier 1.
E' ora necessario un approccio diverso, basato su trasparenza e visibilità su tutti i livelli; il coinvolgimento e la formazione degli operatori più strategici multi-tier è il prossimo passo da compiere per potenziare l'efficacia di questi strumenti.
Naturalmente è richiesta una strategia di risk management adeguata, dal momento che i rischi sono maggiori risalendo a monte la filiera
Una focal company dovrebbe mappare correttamente la sua rete e valutare attentamente il suo parco fornitori, in modo da selezionare quelli più strategici e ridurre i rischi; successivamente i fornitori devono essere coinvolti e formati ed è necessario firmare accordi con banche e provider di tecnologia per sviluppare soluzioni ad-hoc.

Se simili progetti vengono realizzati correttamente, per la focal company è possibile rafforzare le relazioni con i partner strategici e sfruttare completamente il potenziale di tutta la supply chain; inoltre la crescita delle attività diventa maggiormente sostenibile nel lungo periodo.
Allo stesso tempo anche i piccoli fornitori a monte, se considerati strategici, possono beneficiare del SCF senza costi o rischi aggiuntivi.
Ci sono però dei vincoli da tenere in considerazione: i fornitori devono essere strategici, avere già una relazione diretta e forte con la focal company e la spesa in acquisti deve essere maggiore di una soglia minima stabilita; in caso contrario lo schema non sarebbe conveniente per il buyer.
D'altra parte il fornitore deve avere poche alternative di finanziamento, soffrire di problemi di liquidità e avere un costo del capitale più alto di quello della focal company, altrimenti dal suo punto di vista questa soluzione non avrebbe senso.

Casi di studio

Per quanto riguarda le esperienze governative, è stato analizzato il modello di business di una piattaforma elettronica early payments, Urica, lanciata dal governo inglese; è stato inoltre studiato uno schema pubblico di SCF gestito direttamente dalla National Health System Agency nel Regno Unito.
Facendo riferimento al SCF per le PMI, il caso più interessante è stato quello relativo al progetto Promise-to-pay Engine, in fase di sviluppo in Olanda con il contributo del governo, dell'università di Windesheim e di gruppi di focal compagnie ed investitori; successivamente sono stati considerati due service provider specializzati in SCF per le PMI, Oxygen Finance (Regno Unito) e Taulia (Germania).
L'ultimo caso di studio ha riguardato Philips, che sta sviluppando un interessante progetto di SCF Multi-Tier per coinvolgere tutti i fornitori più strategici della supply chain e ottenere una crescita collettiva maggiormente sostenibile nel lungo termine.
La seguente tabella (tabella 2) presenta una sintesi dei casi di studio di questo lavoro:

TREND	CASE STUDIES	COUNTRIES	INTERVIEWS
Governmental experiences	**Urica**: web-based electronic early payments platform funded by the British government and other investors. Solutions addressed to all SMEs suppliers, especially exporters, for which is possible to assess a rating. The discount rate fluctuates around the 2% of the invoice nominal value, depending on the rating and the early payment timing. No additional costs and risks fo the buyers.	**UK**	1) A board member of SCF community from Cranfield University. 2) Global Network Development Director of Urica. 3) Project manager of SCF for SMEs from the Dutch Ministry of Economic Affairs. 4) Managing director of Taulia Germany. 5) CEO of Oxigen Finance. 6) Philips´ employee in the Procurement Finance department, developing a thesis on SCF. 7) Philips´ employee in the Procurement Finance Departement focusing on the Multi-tier SCF project.
	National Health System: public SCF scheme in which the British government, thorugh the NHSBSA, plays the role of focal company in the community pharmacies´ supply chain. The suppliers are funded by CityBank with a convenient rate, based on the credit risk of the public authority (monthly 0,6% of the invoice nominal value). The program has no entry and exit costs and offers also the opportunity to get early payments up to a minimum of 7 days after the approval of invoices.	**UK**	
SCF for SMEs	**Promise-to-pay Engine**: Dutch project for an indipendent SCF finance entity in collaboration between the government, Windesheim university, financial institutions and focal companies. The aims of this entity are to sponsor SCF and spread its knowledge, to act as a single interface between the buyers and the suppliers, to facilitate the collection of funds and to function like a chamber of compensation in order to manage the financial flows in the best way. The main financial goal would be to unloack a volume of €5 billions within the end of 2018.	**Netherlands**	
	Taulia: technology provider for supplier financing, leader in USA,UK, and Germany. It offers SCF, Dynamic Discounting and a new solution combining the advantagies of the previous two. The buyers can fund these programs on their own or using the capability of third parties. The competitive advantages are the flexibility of the solutions, the availability also for the SMEs, the possibility to integrate the instruments in ERP systems of the firms and to syncronize in real time the platform, the possibility to define the discount rate through a bid-ask mechanism between buyers and suppliers.	**Germany**	
	Oxygen Finance: early payments technology platform helping buyers and public authorities to accelerate and automate suppliers' payments. The solutions are available for everybody and no investments are required since the provider is responsible for all the aspects of the project. No third parties are included, peer-to-peer solutions ad-hoc for the clients, Pay-for-performance model and efficiency improvements guaranteed.	**UK**	
Multi-tier SCF	**Philips**: Multi-tier SCF project in phase of development with the most strategic suppliers. The aim is to support these subjects in order to achieve a larger sustainability of the business in the long period and to enforce the relationships along all the supply chain. No additional costs or risks for the suppliers, significant investments for Philips and no benefits in the short period. Important screening of suppliers: direct relationship buyer-Tier2 suppliers, minimum of procurement expenditure, higher suppliers' interest rate, suppliers' liquidity problems. The solution involves a bank, which decides the interest rate within a pre-established range, spefic technology developed by the bank or a service provider.	**Netherlands**	

Tabella 2: sintesi dei casi di studio.

Limitazioni e sviluppi futuri

Il SCF è una tematica complessa e allo stesso tempo un nuovo ambito di applicazione; per questo motivo ci sono ancora molti passi in avanti da compiere e tanti aspetti da approfondire maggiormente, specialmente se si considera che il potenziale di questi strumenti è fortemente influenzato dal contesto economico-finanziario, che recentemente è per definizione in continua evoluzione.

Inoltre, la possibilità di mettere in pratica soluzioni di questo tipo dipende dalle caratteristiche e dalle condizioni degli attori coinvolti, che cambiano molto da un paese all'altro.

Di conseguenza potrebbe essere utile realizzare analisi più dettagliate rivolte ad un singolo paese, o ad un insieme di paesi molto simili, in modo da ottenere implicazioni più specifiche e ridurre il rischio di generalizzare troppo.

Un'altra considerazione interessante si può fare riguardo alla terminologia del SCF; essendo un tema abbastanza recente, non c'è ancora un vocabolario universalmente condiviso che definisca precisamente tutti i suoi aspetti.

Come studiato nell'analisi della letteratura, ci sono varie definizioni del SCF e diverse interpretazioni di questo termine; inoltre non è nemmeno chiarissimo quali soluzioni far rientrare all'interno di questa categoria, dal momento che sono proposte differenti classificazioni.

Alla luce di ciò sarebbe importante realizzare dei lavori che aiutino a fornire una terminologia ufficiale universalmente accettata e condivisa a livello internazionale; questo sarebbe sicuramente utile per fare maggiore chiarezza ed esprimere in maniera completa il potenziale di questi schemi.

Un ultimo limite è che questo lavoro è prevalentemente teorico, dal momento che il l'attenzione maggiore è stata rivolta al futuro del SCF; è infatti vero che queste tematiche stanno guadagnando interesse nei paesi più avanzati e che i soggetti più attivi nel sistema economico stanno cominciando a sviluppare alcuni interessanti progetti innovativi, ma d'altra parte questo è solo l'inizio e di conseguenza non ci sono ancora molte evidenze empiriche ed indicatori numerici.

I progetti sono costosi e tendenzialmente i risultati numeri sono confidenziali; per questo motivo studi futuri potrebbero essere indirizzati a produrre dati quantitativi su costi e benefici del SCF per gli attori coinvolti nelle varie soluzioni.

1 Research purpose

This chapter presents, in its first part, a brief introduction of the topic and a general overview of the context in which the research has been carried out; this is followed by the objectives of the work, in the form of its research questions, and the general approach of the study.

1.1 Introduction

In the last decades the global economic and financial environment gradually evolved reaching an enormous complexity, which is seriously testing the ability of the economic operators, in particular the firms, to react to the abrupt challenges and difficulties of their businesses.

Market competition increased significantly and consumers are becoming even more aware and informed, but especially exigent both in terms of goods and services quality price ratio, both in terms of a widespread range of aspects concerning to the corporate social responsibility sphere. Globalization and customization are demanding to be quick and flexible in satisfying customer needs, but at the same time more efficient to manage all the several competitive pressures resulting from the numbers of players, their market power and their strategic interactions.

Product, process and organizational-managerial innovations involve heavy research and development investments; over recent years carrying out these types of activities requires increasing efforts and costs proportionally to the achieved results, so it’s progressively more costly to introduce innovations, whether radical or incremental they are. Since the technological innovation is passing through a yield decreasing step, the economic subjects try to improve their performances by avoiding effort duplication and adopting cost-sharing strategies and cooperation agreements.

Another important factor is the risk, which is greater the greater the investments required are; to mitigate this problem lots of firms are adopting risk-sharing and risk-pooling strategies in order to create a better diversified project portfolio and to reduce the sunk costs which could arise from potential failures.

We can find several other aspects that recommend a more collaborative and engaging approach along all the supply chain to develop the business more successfully in a very competitive market environment: the increasing obsolescence of goods and services and their consequent life cycles and time-to-market reduction need to be faced by adopting innovative solutions to exploit all benefits from the economies of rapidity; on top of that, the product systemic complexity intensification, together with the greater convergence of the main technological chains and the multi-polar innovation sources represent further reasons to a network level monitoring and coordination of the activities. It is almost a matter of fact that the success increasingly depends on the community a firm is able to manage or is able to join in.

For these reasons developing and implementing collaborative and integrated corporate management solutions has been becoming critical; the supply chain is a concept that, over the past 30 years, gained great attention in academic literature and lots of critical studies and insights are available.

However, there is an aspect that just over the very recent years has been animating discussions and gaining interest from the economic and financial community; such a disruptive and deeply prominent development of innovative and collaborative solutions to manage relationships along the supply chain has focused mainly on the material and information flows so far.

To better exploit all the several competitive advantages of these integrated and complex networks, it is necessary to handle from the same perspective also the financial infrastructure; this is an incredible opportunity to build a strongly sustainable competitive advantage over time, in times in which it is increasingly difficult to boost sales and revenues and it is critical doing something the others do not, or alternatively doing it better and cheaper.

1.2 Research context

These considerations are gaining even more importance considering the financial crisis of 2008 and the debt sovereign crisis of 2010. During the last years the focus on working capital management and cash flows along the supply chain has grown considerably.

It has gradually occurred a heavy granting credit criteria restriction and a deterioration into the financial ratings of the companies, resulting in a dramatic financing reduction and interest rates soaring; on the one hand, the financial crisis has reduced the availability of banking system and on the other hand the economic crisis has worsened the credit worthiness of companies.

At the same time it is possible to notice a delay in public administration and private sector payment time and that had a generalized cascading effect on all the chains. The Cash-to-Cash cycle[1] – an easy to use metric to calculate how long cash is tied up in the main cash producing and cash consuming areas – grew significantly during the last decade and that implies a very difficult situation for the firms, in particular because it is to be added to the credit crunch and rising costs previously mentioned.

From a supply chain perspective, the financial weakness of an actor becomes a risk even for all others, including the safest and most valuable in terms of economic fundamentals.

In such a competitive and complex scenario it is critical to identify innovative solutions which reduce the distance between supply chain and finance, creating the opportunity to share the benefits of the two disciplines along all the actors of the economic system.

Inter-company financing within the supply chain is called Supply Chain Finance (SCF) and a possible definition of SCF is provided by Pfohl and Gomm [2009]:

"*Supply chain finance (SCF) is the inter-company optimization of financing as well as the integration of financing processes with customers, suppliers, and service providers in order to increase the value of all participating companies*."

[1] The Cash to Cash Cycle = Receivable Days + Inventory Days - Payable Days. Generally, the lower is the number, the better.

The task of SCF is to save capital costs by means of better mutual adjustment or completely new financing concepts within the supply chain, eventually in combination with a changed role or task sharing.

The focus of the previous definition refers to the inter-company financing within the supply chain; that is another interesting reason to deeply investigate this topic, since it could offer some realistic alternative to solve the widespread third-party financing hurdles, typical of this age.

Still now the banks or other primary financial institutions are the most common funding sources; in such uncertain, volatile and highly competitive economic environment these subjects have to deal with increasing significant problems of asymmetric information[2].

Contrary to what is supported by the Perfect Market Theories and the Welfare Economics[3], information are costly and are not uniformly distributed amongst economic actors.

The financing entities have to deal with ex-ante asymmetric information problems, related to the quality of the firm and the project they would like to select; that theme is known as adverse selection or hidden information and it refers to a market process in which the bad products or services are more likely to be selected. Another risk factor is moral hazard or hidden action, an ex-post asymmetric information situation in which a party is more likely to take risks because the costs that could result will not be borne by the party taking the risk.

Moral hazard arises because an individual or institution does not take the full consequences and responsibilities of its actions, and therefore has a tendency to act less carefully than it otherwise would, leaving another party to hold some responsibility for the consequences of those actions.

Moral hazard also arises in a principal–agent problem, where one party, called an agent, acts on behalf of another party, called the principal.

The agent usually has more information about his or her actions or intentions than the principal does, because the principal usually cannot completely monitor the agent; the

[2] Information asymmetry deals with the study of decisions in transactions where one party has more or better information than the other. This creates an imbalance of power in transactions which can sometimes cause

[3] The field of Welfare Economics is associated with two fundamental theorems. The first states that given certain assumptions, competitive markets (price equilibria with transfers, e.g. Walrasian equilibria) produce Pareto efficient outcomes. The assumptions required are generally characterized as very weak. The first fundamental theorem is said to capture the logic of Adam Smith's invisible hand and the second fundamental theorem states that given further restrictions, any Pareto efficient outcome can be supported as a competitive market equilibrium.

agent may have an incentive to act inappropriately (from the viewpoint of the principal) if the interests of the agent and the principal are not aligned.

As a result of that, the potential lenders don't invest at the optimal level and usually ask for a higher interest rate.

To mitigate the adverse selection it is quite common requiring borrowers to provide a guarantee, in order to be able to claim against them in case of bankruptcy. Moral Hazard might be faced by implementing incentive mechanisms in order to align the interest of the two parties.

However these solutions are costly and their effects are not completely predictable; over the last ten years other financing alternatives have been developing in order to facilitate the credit access to the firms with fewer opportunities from this point of view.

One of those is Corporate Venture Capital (CVC), which is the investment of corporate funds directly in external start-up companies and refers to a practice where a large firm takes an equity stake in a small but innovative or specialist firm; it may also provide management and marketing expertise and the objective is to gain a specific competitive advantage.

But this solution is not sufficiently powerful to solve the credit rationing problem resulting from the foregoing considerations.

Firstly the CVC is designed to help only start-up companies or SMEs, secondly it affects the ownership structure and more often than not firm's governance; that means these firms are not independent anymore, but have to comply with the covenants[4] established by who provides the funds.

Finally it is no longer sufficient thinking in terms of single enterprise, but it's critical to study financial instruments that involve all the actors of the supply chain; in times when it's becoming increasingly difficult to obtain new additional funding, the best thing to do is to optimize the available financial resources and to create new opportunities through collaborative strategies better focused on whole network financial flows.

[4] Covenants are undertakings given by a borrower as part of a term loan agreement. Their purpose is to help the lender ensure that the risk attached to the loan does not unexpectedly deteriorate prior to maturity. From the borrower's point of view covenants often appear to be an obstacle at the time of negotiating a loan and burdensome restriction during its term.

2 Literature Review

Before investigating SCF it is useful to introduce some concepts which come before from the logical point of view and have been much more deeply investigated over the past decades.

2.1 Supply Chain

The supply chain is a concept that has been deeply studied since the 80's, in particular if combined with supply chain management.

2.1.1 Supply Chain Definitions

There is a widespread range of supply chain definitions and the most relevant are reported below:

La Londe and Masters [1994] define it as:

A set of firms that pass materials forward; raw material and component producers, product assemblers, wholesalers, retailer merchants and transportation companies are all members of a supply chain.

Lambert, Stock, and Ellram [1998] define it as:

The alignment of firms that brings products or services to market.

Christopher [1992] defines it as:

The network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer.

One of the most complete definitions is provided by Mentzer et al. [2001][5]:

Supply chain is defined as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer.

This definition also offers a broader perspective of supply chain and provides the following framework (figure 2.1):

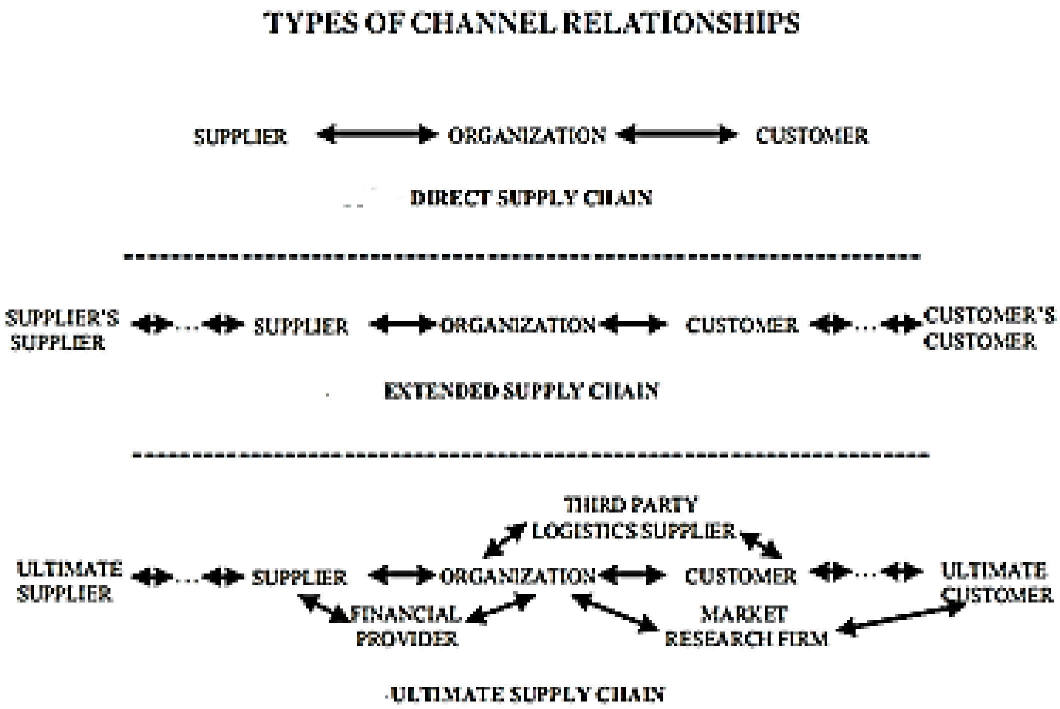

Figure 2.1: A popular supply chain definition.

Source: Mentzer et al. [2001].

Encompassed within this definition, we can identify three degrees of supply chain complexity: a "direct supply chain," an "extended supply chain," and an "ultimate supply chain."

[5] The reference is to "Defining supply chain management" by John T. Mentzer, William DeWitt, James S. Keebler, Soonhong Min, Nancy W. Nix, Carlo D. Smith, Zach G. Zacharia from Journal of business logistics, Vol.22, No. 2, 2001.

A direct supply chain consists of a company, a supplier, and a customer involved in the upstream and/or downstream flows of products, services, finances, and/or information. An extended supply chain includes suppliers of the immediate supplier and customers of the immediate customer, all involved in the upstream and/or downstream flows of products, services, finances, and/or information.
An ultimate supply chain includes all the organizations involved in all the upstream and downstream flows of products, services, finances, and information from the ultimate supplier to the ultimate customer.

2.1.2 Supply Chain Structure

Now just to grab a basic idea of what could be the structure of a supply chain, the figure 2.2 is reported below:

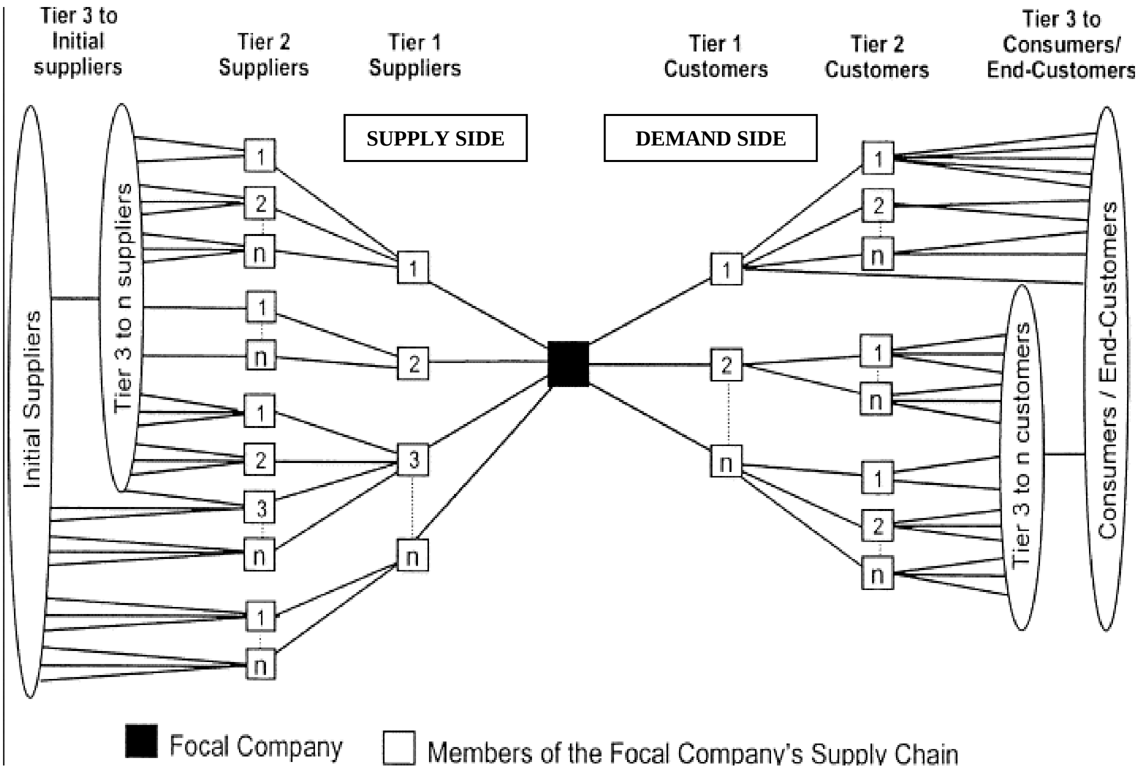

Figure 2.2: A schematic representation of a supply chain.

Source: Sianesi [2011], elaboration by the author.

This representation shows the point of view of a manufacturing company in relation to which all supply side actors are considered as suppliers and all demand side actors are considered as customers.

The system is not linear but it is a supply and distribution network extending over multiple levels, with several actors on each of them; the focal firm is the more relevant along all the supply chain and the information and material exchanges take place between different levels and also between actors of the same level.

2.2 Supply Chain Management

Supply chain management is a concept that is gaining in popularity and importance and there is still much to investigate, since there is no a universally accepted definition yet.

As a result of that, there are not many empirical researches on the benefits of supply chain management and certainly studies and analysis will improve if a single definition would be adopted.

The evolution of the recent competitive environment resulted in an even greater interest in the management of the activities external to the production system.

The new focus of managers is addressed to the synchronization of the production system with the upstream and downstream activities of the firms.

There are some key factors underlying the transition from a traditional management of the internal activities to an innovative handling of the internal processes in the broader environment of a supply chain (Sianesi et al. [2011]):

- The evolution of consumers and the market trend towards an increasing customer focus, in order to compete both in terms of product variety and in terms of flexibility, punctuality and delivery frequency.

  These performances depend on all participants in the processes of designing, planning, supplying, manufacturing and assembling;

- The globalization, intended as the broader and global extension of markets the firms have to catch up, and the “glocalization”[6], that is to say there are several local particular features not to be neglected.
  That results in the increase of distribution network nodes;

- The delocalization of production and of the delivery market, in order to get closer to the customers and as a result of pressures on cost reduction;

- Outsourcing, consisting in the delegation of non-core activities in order to focus on the strategic business and to rely on specialized firms and reduce production costs;

- The increasing uncertainty, both in terms of market demand and in terms of supply side; that implies serious planning problems.

The internal management refocusing on the whole supply chain refers to the concept of supply chain management; it’s a systemic approach handling the entire information and materials flows, from the raw materials to the finished products, whose purpose is to best satisfy the final customers with the lowest possible cost for the system.

2.2.1 Supply Chain Management Definitions

Here some significant definitions of supply chain management are reported:

Lambert et al. [1998] define it as:

The integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.

[6] “Glocalization” is the adaptation of a product or service specifically to each locality or culture in which it is sold and serves as a means of combining the idea of globalization with that of local considerations. The term first appeared in the late 1980s in articles by Japanese economists in the *Harvard Business Review* and describes a new outcome of local conditions toward global pressures.

Stock and Boyer [2009] define it as:

The management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing, and related systems that facilitate the forward and reverse flow of materials, services, finances and information from the original producer to final customer with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction.

On the forum website **(**www.scm-institute.org**)** supply chain management is also defined like that:

It is not a business function, rather it is a new business model necessary for an organization's success and everyone in the organization needs to be involved.

In order to univocally analyze a particular supply chain and to set a point of reference for researchers and managers it might be useful to consider one of the several framework provided by the literature.

2.3 Supply Chain Finance

Supply chain finance is a relatively recent argument that is gaining interest and importance over the years, especially in parallel with the economic and financial environment evolution.

Although the supply chain management issue and the network logic are already deeply investigated themes, the financial perspective is still a track the firms tend to deal with from an individual point of view.

The management of financial flows generates objections and discussion among the several departments of the same company due to its own nature.

It’s very difficult to mediate across the requirements of all parties and to prioritize the provisions of funds in order to satisfy the aims of general management and at the same time not to create malcontents among the team leaders of functions.

That is true even more considering a supply chain perspective, because these difficulties at an individual firm level are extending to the network and consequently are making the mediation process even more complicated.
On the other hand, if these widespread problems are overcome, the company could exploit a truly powerful and sustainable competitive advantage and the benefits for itself and for the other actors involved in a similar collaboration are going to reward much more than the efforts and costs initially incurred.

2.3.1 SCF Definitions

The most recent definition of SCF is provided by Pfohl and Gomm[7] [2009]:

Supply chain finance (SCF) is the inter-company optimization of financing as well as the integration of financing processes with customers, suppliers, and service providers in order to increase the value of all participating companies.

Here some other definitions are reported:

The professional services company PricewaterhouseCoopers[8] defines it as:

A set of technology solutions and services that link all the parties in the supply chain - the buyers, sellers and providers of financing - in order to enable end-to-end visibility, lower financing costs, increase availability, and expedite the delivery of cash.

Robinson [2007] defines it as:

Managing, planning and controlling all the transaction activities and processes related to the flow of cash among SC stakeholders in order to improve their working capital.

Hofmann[9] [2005] defines it as:

[7] The reference is to the paper “Supply chain finance: optimizing financial flows in supply chains” by Hans-Christian Pfohl and Moritz Gomm [2009].
[8] PricewaterhouseCoopers is a multinational professional services network. It is the world's second largest professional services network, as measured by 2013 revenues. The reference is to the article “Demystifying supply chain finance - Insights into the what, why, how, where and who” [2009].
[9] The reference is to the paper “Supply Chain Finance: some conceptual insights” by Erik Hofmann [2005].

Supply Chain Finance is an approach for two or more organizations in a supply chain, including external service providers, to jointly create value through means of planning, steering, and controlling the flow of financial resources on an inter-organizational level.

These definitions consider the term SCF in a broader sense focusing on the goals of that solution, which is to facilitate transactions between trading partners and to provide financing and payment options improving each partner's financial position.
The technology and financing arrangements used to achieve these goals are secondary and can adapt over time without changing the understanding and the meaning of SCF itself.
So in that sense, the fundamental idea of SCF is to provide more liquidity to all the actors, to improve their financial statement and to optimize or better manage the financial flows along all the chain; these results can be achieved through pre-shipment, post-shipment, post-acceptance financing and with or without a facilitating technology.
Other definitions are more focused on how these things are done and consider SCF in the view of technology solutions.

One of those is the Aberdeen Group[10] definition [2006]:

A SCF solution is a combination of trade financing provided by a financial institution, a third-party vendor, or an enterprise itself, and a technology platform that unites the trading partners and the financial institution electronically and provides the financing triggers based on the occurrence of one or several supply chain events.

This point of view is the same of some parts of literature which evaluate SCF as a particular practice of a wider range of solutions included in the financial supply chain management.
In this perspective SCF is interpreted just as a set of post-shipment more automated and technological solutions providing easier and cheaper liquidity to a wider range of suppliers and at the same time granting good payment terms to the focal companies (Shang et al., Demica, [2009]); it's like a more advanced version of reverse factoring

[10] Aberdeen Group Inc. is a provider of fact-based business intelligence research founded in 1988, trying to understand the implications and results of process innovation, methodology advancements, technology deployments, and business re-engineering.

based on a more holistic approach, including more players and making available more information, as well as providing flexibility and visibility of payment processes.

2.3.2 SCF Perspectives

The Supply Chain Finance value added, as compared to the traditional solutions, is to be found assuming a few synergic and complementary perspectives (Osservatorio of Supply Chain Finance[11], Politecnico di Milano [2013]).

- The process perspective, which refers to the entire business relationship, including contracts and orders management activities and invoice issuances, supporting financing operations with broader information better reflecting the interactions;

- The relationship perspective, as SCF doesn't rely just to single enterprises, but is typically focused on the relations between different customers and suppliers; that enables financing collaborative models and reduces the aggregate requirement;

- The network perspective, because SCF solutions deal with a widespread range of community relations, in order to achieve a significant critical mass to better exploit all the benefits arising from economies of scale and risk sharing strategies[12].

[11] The "Supply Chain Finance Osservatorio" of Politecnico di Milano School of Management was established in 2013 to satisfy the increasing interest of firms and Public Administrations to the opportunities of working capital optimization and access to credit provided by supply chain finance solutions. The Osservatorio is also part of the International Supply Chain Finance Community (ISCFC), which aims to share and improve analysis and researches at the European level.

[12] A possibility to implement risk sharing strategies is adopting cooperative agreements, which are governance structures that are intermediate to the market and the firm. This form of organization may be used when it is inappropriate for a firm to internalize an activity, but when at the same time there are high transaction costs associated with the market exchange.

2.3.3 A SCF Framework

So far it was given a general overview of the key concepts of SCF but it has not seen yet how this approach could be practically implemented; it might be specified that there are several different patterns and a really diversified multitude of actors could be involved.
For the time being, it's useful referring to the work of Pfohl and Gomm[13]; in order to conceptualize SCF, they studied which assets (objects) within a supply chain are actually financed by whom (actors) and on what terms (levers).
The figure 2.3 graphically describes this approach:

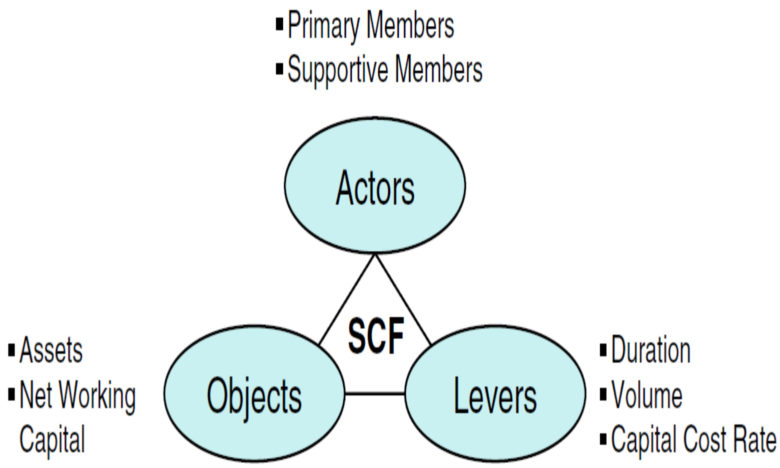

Figure 2.3: A famous framework for SCF.

Source: Pfohl and Gomm [2009].

Objects of SCF

The objects of SCF are fixed assets, permanently providing a basis for the business operations, and working capital, which is variable day-by-day.
The term working capital comprises all those asset items that are retransformed into liquid assets within one production cycle or at least within one year; it's a financial metric which represents operating liquidity and it coincides to current assets.

[13] The paper written by Pfohl and Gomm is "Supply Chain Finance: optimizing financial flows in supply chains". This article reviews the state-of-the-art of research regarding financial flows in supply chains. In doing so a conceptual framework is proposed.

Net working capital (NWC) is calculated as current assets minus current liabilities (it is a derivation of working capital) and it is a metric commonly used in valuation techniques to compute the DCFs (Discounted cash flows)[14].

If current assets are less than current liabilities, an entity has a working capital deficiency, also called a working capital deficit.

The cash-to-cash-cycle is an important reference to treat dynamically and holistically the net working capital performances within the company and, as well as, within the supply chain.

Actors in the SCF framework

The actors of the supply chain may be classified in primary members or supportive members; the first category includes suppliers, customers, and the focal company.

In fact supply chains usually include focal companies coordinating strategically the network in a hierarchic way; they have to design and manage the system in order to develop their business.

The other players tend to get influenced by these subjects due to explicit or implicit dependency relationships.

An ideal situation sees the focal company as an efficient coordinator of both physical and financial flows throughout the whole network; a similar management saves resources of all participating firms, creating a sustainable win-win situation in which the outcome for every member of the supply chain is better in the network than outside.

These firms have to be responsible for value creation [15] with its suppliers and stakeholders and to lead, settle and build the capacity of the entire supply chain.

The second category includes logistics service providers and financial intermediaries; here it's possible to introduce an interesting difference between the financial intermediaries in the narrow sense and the financial intermediaries in the broader sense.

[14] Discounted cash flow (DCF) analysis is a method of valuing a project, company, or asset using the concepts of the time value of money. All future cash flows are estimated and discounted to give their present values (PVs). The sum of all future cash flows, both incoming and outgoing, is the net present value (NPV), which is taken as the value or price of the cash flows in question. The discount rate used is generally the appropriate weighted average cost of capital (WACC), that reflects the risk of the cash flows. It reflects two things, the time value of money, that is to say the risk-free rate and the risk premium. If the discount rate is WACC, it's appropriate to use as cash flows the FCFF (free cash flow to firm), which is calculated by this formula: FCFF = Operating cash flows – Expenses – Taxes – Exchange in NWC – Changes in Investments.

[15] Defined as: $V(0) = \sum_{t=0}^{\propto} \frac{NCF\ (t)}{(1+WACC)^t}$

The first ones are specialized in the balance of asset and financial requirements between investors and acceptors (banks, insurances, leasing and factoring companies) whilst the others offer performances in order to allow a completion of financial contracts between original and/or intermediary investors and acceptors or to effect this completion easier and cheaper, respectively (brokers, rating agencies, risk management companies).
SCF is a really powerful instrument for the disintermediation of finance, offering alternative solutions to the traditional bank system.

Levers of SCF

The dimensions of financing within the network are based on three axes: the volume of financing, the duration of financing and the capital cost rate; by multiplying the three factors it's possible to compute the capital costs.
The starting point for an inter-company optimization of the financing is the capital cost rate, which depends on the expected return of investments and risk expectance of the investors, on the demands of the outside creditors, as well as the financial structure of the company (WACC approach).
Making reference to the work of Pfohl and Gomm [2009], this approach is described by the SCF cube (figure 2.4), which underlines that measures of SCF can apply to all three dimensions of the cube, in order to reduce the capital costs within the supply chain.

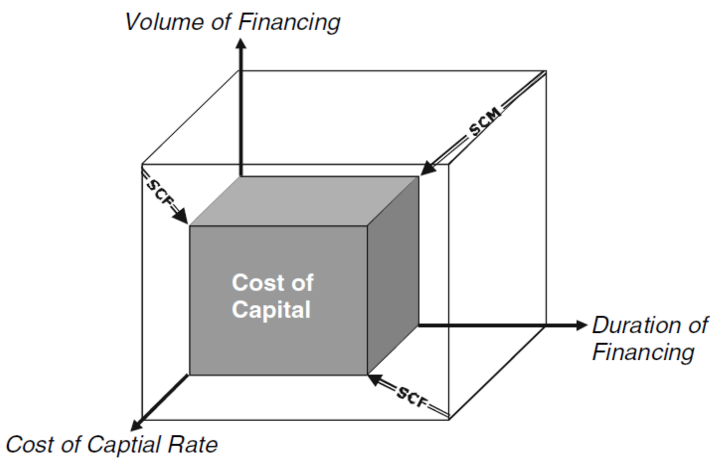

Figure 2.4: Supply Chain Finance Cube.

Source: Pfohl and Gomm [2009].

2.3.4 SCF Opportunities

SCF represents a significant opportunity for all actors involved in the system, namely service providers, financial institutions, suppliers and buyers companies (PriceWaterHouseCoopers [2009]).

As service providers, we are mainly referring to three economic subjects:

- Traditional financing operators, dealing with credit access, primarily financial institutions or factoring companies;

- Information and communication technology operators, providing integration between suppliers and buyers companies;

- New SCF providers, quickly developing a hybrid nature and offering technology platforms and other auxiliary services.

The real challenge for banks is becoming a chain partner and adding value throughout the supply chain; they should extent funds with innovative instruments and, at the same time, capture new business opportunities and manage properly their own exposure.

On the other hand, the ICT providers are prepared to support the supply chain processes, but they have an insufficient expertise in financial issues.

This is why it's critical to build trustworthy partnerships with financial institutions and gradually extent the core business.

It's really difficult to summarize all the opportunities available for the buyers and the suppliers; they look for different objectives, but the most important strength of SCF is to build a win-win situation for the several counterparties.

In relation to this, an important condition to properly run SCF is ensuring consistency with the fundamental principles of supply chain management (Randall and Farris II [2009]):

- Making decisions at the aggregate;

- Open up the information flows;

- Encourage commitment among partners to make decisions that result in the best value for customers.

Strong supply chain interactions lead to increased profits, decreased risk and improved competitive advantages; a similar approach implies to smartly extend the classic firm-oriented practices dealing with cash-to-cash cycles, cash flows and weighted average cost of capital (WACC)[16], in a view of a more holistic supply chain partnership.

2.3.5 Challenges of SCF

Referring to the work of Dileep More and Preetam Basu[17] [2012], it's possible to analyze the potential challenges of SCF and which are their interactions, making an insight into their complex dynamics.

The disturbing factors can be found in internal or external dynamics; in particular, the first category arises from a lack of knowledge and inappropriate organizational structures and processes and the second refers to the technological complexity and the differences in corporate culture, values, habits and traditions.

Some of these challenges are not individually manageable and that should induce the supply chain players to cooperate and to take innovative actions in order to properly react to the changing environment.

Made this distinction, a list of SCF challenges is reported, organized by functions of a firm potentially involved:

Human resource (HR)

The problem is to the lack of knowledge and information among supply chain managers about SCF; to optimizing financial flows and working capital it's critical to develop best practices of SCF solutions in order to provide a benchmark for all actors.

---

[16] The weighted average cost of capital (WACC) is the rate that a company is expected to pay on average to all its security holders to finance its assets. The WACC is calculated taking into account the relative weights of each component of the capital structure .Weighted average cost of capital: $WACC = k_E \cdot E/(D + E) + k_D \cdot D/(D + E)$, where k_D is the cost of debt, k_E the cost of equity, D and E the book values of debt and equity.

[17] Challenges of supply chain finance [2012], by More and Basu, Operations Management Group, Indian Institute of Management, Calcutta, India

Information technology (IT)

A lot of financial transactions are processed very inefficiently; several organizations are still using paper-based manual processes to manage physical and financial flows and it implies loss of visibility along the whole chain.

Finance

Most of cash management systems used today by the financial departments have the myopic objective to maximize just the benefits for their organizations; it's also important to consider the impact of the decisions on the entire SC.

The accounting perspective is focused on reducing cash-to-cash cycle, which measures liquidity and organizational valuation; one possibility is to extend on average the account payables.

On the other hand, this myopic strategy brings negative effects on the suppliers, as they get constrained on cash; in a tough economic environment in which banks tends to lend less, it's not always easy to access capital through traditional channels; therefore corporations are looking for alternative solutions within the industrial side.

Liquidity problems and capital needs are straining many buyer-supplier relationships. SCF programs are possible levers to benefit buyers and suppliers at the same time.

Inter and intra-firm coordination

To reach good results, it's also important to cooperate and share information and plans among the several departments of a company and among different firms.

Many times operation managers buy materials in bulks to get a better price, while financial officers require purchases in small units to lighten the company's cash position; these departmental divergences and intra-firm strategic differences lead to sub-optimal credit decisions for the entire supply chain.

Organizational policies and strategy

To make an example, the selection of suppliers is a critical decision and companies have to review the processes through those are chosen; today suppliers frequently share their business risks with other actors of supply chain and their performances directly influence the global value of the network.

It's important to properly analyze both the operational capability and financial safety of a supplier because it's buyer's interest to keep strategic partners strong; potential defaults of suppliers and replacing costs have to be evaluated, and this requires a collaborative and coordinated approach.

Institutional factors

Macro-institutional factors, cultural differences and divergences in law also impose serious challenges for governments and institutions.

The cross-border transactions are in fact more complex in nature, involving multiple additional challenges like currencies, languages and legal implications.

2.3.6 Players of SCF

Now the next step is to provide an overall classification of the actors potentially involved in SCF.

Taking inspiration from the work of Hofmann [2005][18], the SCF institutional entities include both the companies of scheme and their organizational units.

Consequently, in order to set properly the classification, a distinction between macro-institutional actors and micro-institutional actors has to be done.

The first group is composed by:

- Industrial and commercial companies: this category refers to focal firms of supply chains and its suppliers and customers.
  In this context several supplier-buyer relationships act before the product/service reaches the final customer;

- Logistics and services providers (LSP): in a very competitive and evolutionary economic environment companies are increasingly focusing on their core competences and, as a result of that, service sector is growing.

[18] The reference is to the paper "Supply Chain Finance – some conceptual insights" by Erik Hofmann [2005]. The work analyzes the intersections between finance and logistics/supply chain management, which are opening new businesses for banks and other financial and logistics services providers. This paper represents a first step enabling executives to look behind the supply chain finance approach.

In the past these operators worked with transportation and storing of materials and goods between counterparties, but now there are several other business opportunities to exploit, for instance payments and after-sales services.

In addition to the traditional entities of supply chain management, are reported now those concerning directly to the SCF:

- Financial institutions: this category includes banks and all other financial services providers.
  There are two different vision, the narrow one and the wider one: the first groups all institutions whose business is addressed to balancing other entities' investment and financing needs, the second comprises all subjects aiming at the conclusion of financial contracts between original and borrowers, for instance capital investment at banks or insurances, securities investments, risk coverage, information and consulting services[19];

- Investors: external financing needs are reflected also on investors, whether public or private they are; first subjects are usually close to the raise equity, the second category is broader and includes real estate investors, venture capital companies, funds, funds of funds.

It's also important to analyze the several settings of the internal processes; in a traditional logic, just departments concerning operational activities would have been considered, but in a SCF perspective also the financial functions are included.
In that sense, the real challenge is to solve the trade-offs and to coordinate the several participants, looking for the best allocation of tasks and responsibilities and, at the same time, following the guide lines of top management.

[19] For the scope of this work information and consulting services concern mainly two categories of subjects, the rating agencies and the merger and acquisition advisors. The first ones are companies that assign credit ratings, which rate a debtor's ability to pay back debt by making timely interest payments and the likelihood of default. The second ones are companies specialized in aspects of strategic management, corporate finance and management dealing with the buying, selling, dividing and combining of different companies and similar entities that can help an enterprise grow rapidly in its sector or location of origin, or a new field or new location.

2.3.7 Benefits of SCF

The benefits of SCF depend on the solution adopted and on the role of each actor within the chain; in particular the reference is to the focal player, namely if the SCF is buyer-centric or seller-centric.

The first situation relies on a large and reliable buyer which has to deal with a multitude of suppliers, in general with higher credit risks; the second is the opposite, with a big company leading the chain and selling its products or services to several smaller buyers.

Considering the definition of SCF given in this work, is analyzed the case of buyer-centric solutions, which are typically more frequent and innovative; vice versa seller-centric financing usually resembles the traditional framework, although some differences cannot be neglected.

In this context, a large and credit-worthy buyer has three line of reasoning to analyze the benefits of a SCF arrangement (Business Innovation Observatory, Supply Chain Finance [2014]).

First line

The idea is to improve working capital by extending a buyer's days payables outstanding [20] and consequently by reducing the cash-to-cash cycle; this indicator measuring how long cash is tied up between procurement and sales and it is defined as the time between the payment of materials and components and cash collection for sale of the finished product.

In this case SCF works as a way to partially share suppliers' benefit by extending payment terms; on the other hand it's important to fairly split the advantages, since these solutions should support mainly the suppliers.

Moreover the collaboration between suppliers and buyer leads to obtain a reduction in inventories and accounts receivables; this effect, together with the previous one, will realize a significant working capital benefit and frees up cash to be used in other critical areas.

It's critical to control these aspects, since working capital is essential for supporting operational activities and for expansion strategies or specific acquisitions.

[20] Number of days between purchasing an input and paying the supplier.

In addition the financial stakeholders, in particular the shareholders, usually consider working capital ratios as one of the core metrics to evaluate the performance of a company and the quality of management.

To summarize and the criticality of working capital optimization, is reported a study of Aberdeen Group (2007), in which a sample of 400 supply chain and finance professionals were surveyed (figure 2.5):

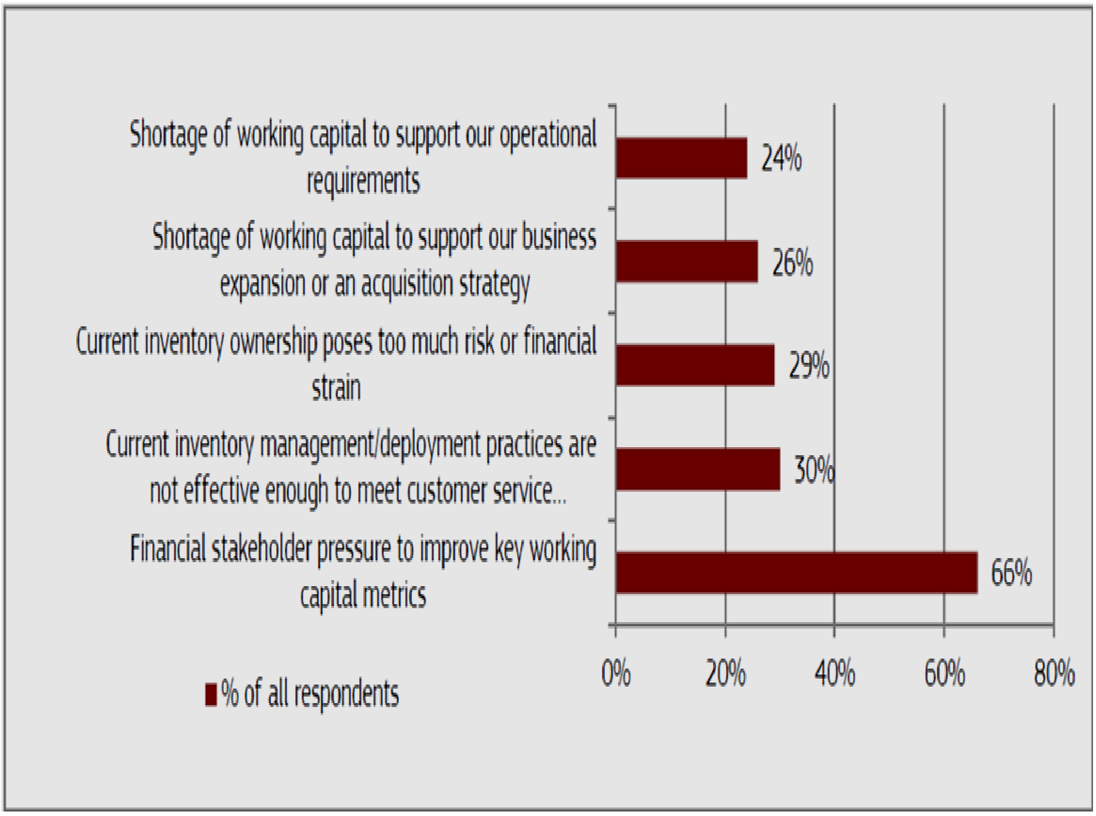

Figure 2.5: Reasons to focus on working capital management.

Source: Aberdeen Group [2007].

Second line

SCF arrangements have to help sellers to get access to capital at a lower cost through leveraging the buyer's credit rating, which is assumed to be better.

This also reduces the default risk of suppliers and the subsequent disruptions over the supply chain; additionally, suppliers see a reduction of the day sales outstanding[21], achieved through a larger availability of capital.

Finally similar collaboration brings to cash forecasting improvements, since it's no longer necessary deal with the cash flow volatility of a traditional buyer-seller relationship; on the other hand, the buyer could negotiate a discount from the suppliers, in addition to the working capital benefits previously mentioned.

Third line

It refers to the risk reduction of the entire supply chain and this is one of the most important aspects of these solutions.

Sometimes valuable and credit-worthy companies deal with problems arising from the difficult situation of the strategic supply chain partners.

SCF buyer-supplier collaboration strengthens relationships and mitigates risks, managing properly working capital positions and offsetting capital needs.

Moreover the correct implementation of SCF solutions increase process efficiency within the chain and in relation to the financial partners, resulting from the high degree of digitalization necessary to apply these instruments.

This alternative framework also creates new business opportunities in the financial sector; in the current economic environment, one of the main interests of a bank is to get a low-risk profit, since the amount of equity they have to hold depends on their risk-weighted assets. [22]

Consequently banks are looking for low risk assets and could be interesting in SCF, since it means opening up a line of credit to financially strong and stable companies. Considering the ongoing transition from Basel 1 to Basel 3, there are two key points: the mandatory minimum capital ratios increased and the calculation of risk weighted assets (RWA) changed (Global Business Intelligence [2012]).

[21] The number of days between the sale of a product and the receipt of a cash payment.

[22] The reference is to the regulatory system of Basel, that establishes the fundamental role of capital in its function to hedge the undertaken risks and, at the same time, as a constraint to the expansion of activities. All activities undertaken by banks entail a risk assumption, which has to be properly measured and supported by capital.

This new regulation implies that high credit rating's RWA decrease and law credit rating's RWA increase, while the old regulation established RWA at a constant level, regardless of the rating of companies.

The figure below (figure 2.6 reports an example of some potential effects on banks RWA in relation with credit ratings of a sample of companies, produced by a transaction to the stricter regulation of Basel 2 and 3:

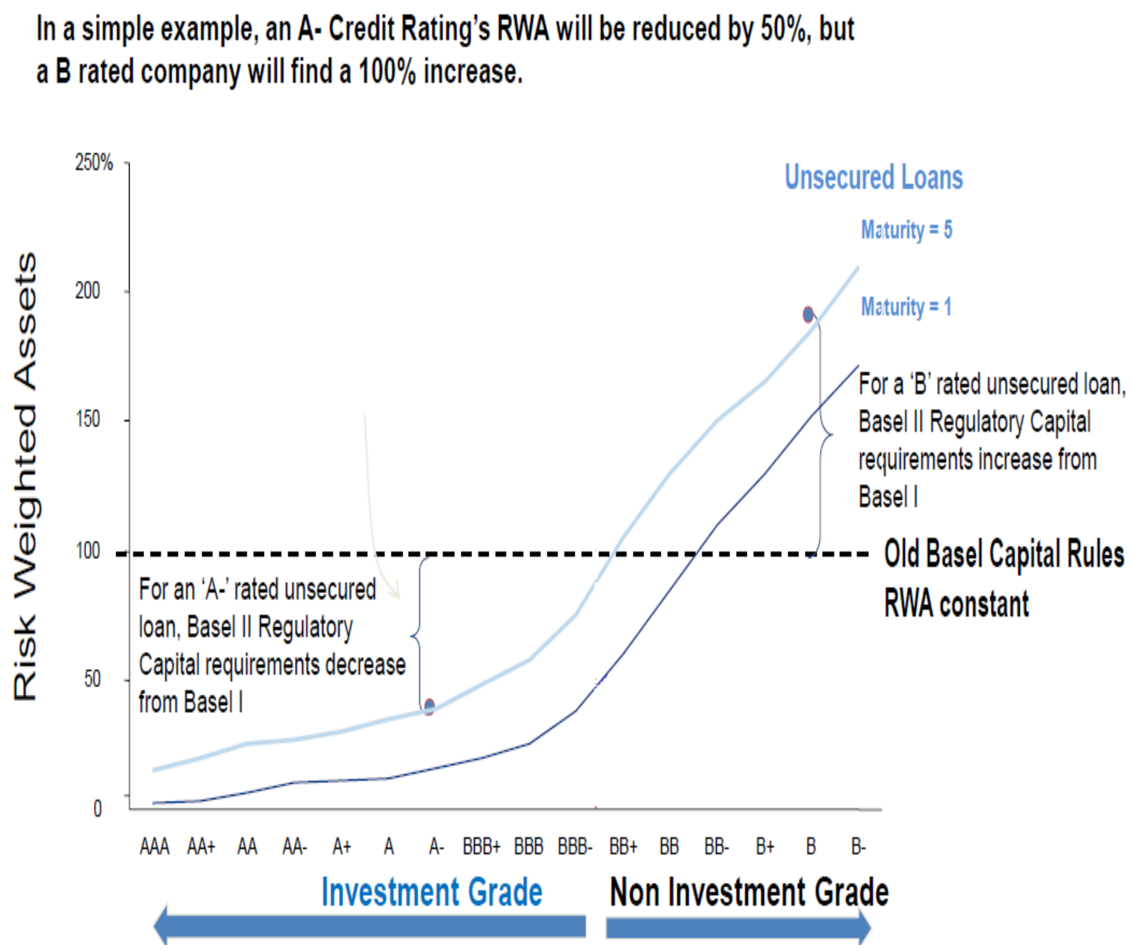

Figure 2.6: Impact of new regulation on RWA, related to the credit rating of companies.

Source: elaboration of the author from Global Business Intelligence Corp. [2012].

As a consequence of that, banks and other financial institutions could be progressively more interested in supporting SCF.

Also the market of technology platforms could be positively affected by SCF; in fact technology usually takes an enabling role in this context, since it's necessary to manage an increasing volume of transactions.
It's critical to exchange efficiently and effectively complex information with a lot of partners and in that view the digitalization can improve traditional financing models and facilitate innovative credit sources.

As a result of that, an important future trend leads to an increasing demand for computerized systems and web-based platforms and that can be a lasting and sustainable competitive advantage for all SCF service providers.

2.4 SCF classifications

The aim of this chapter is to review and classify the main SCF solutions available on the market; it's not an easy task, since there are several of these schemes with no universally accepted definition and presenting overlaps between each other.

2.4.1 Buyer centric vs seller centric solutions

Typically in a buyer centric solution there is a high credit rating corporation managing a wide supply base, which often is segmented in suppliers with different risk and size.
The buyer defines its strategies and purchasing volumes depending on the features of suppliers and this also applies to SCF solutions.
Here (figure 2.7) is reported an example of how can be segmented the annual expenditure of a Fortune 500 buying company[23] (GBI Corp. [2012]).

[23] The Fortune 500 is an annual list compiled and published by Fortune magazine that ranks the top 500 U.S. closely held and public corporations as ranked by their gross revenue after adjustments made by Fortune the impact of excise taxes companies incur.

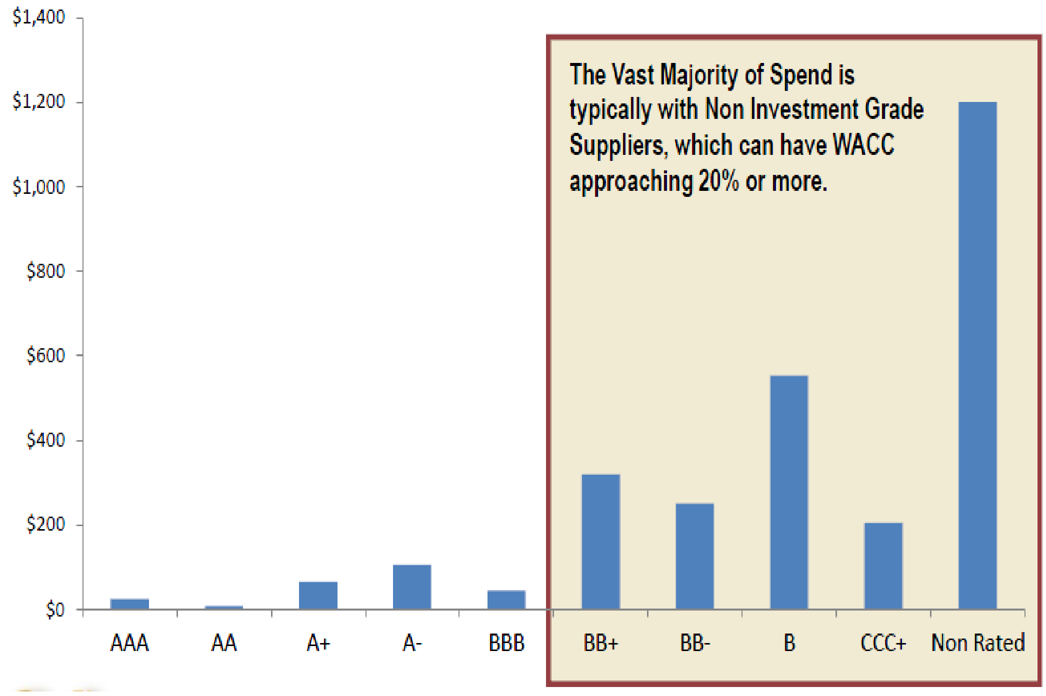

Figure 2.7: Annual procurement spend on direct and indirect suppliers (M$).

Source: Global Business Intelligence Corp. [2012].

It's evident that a large company addresses a significant portion of its purchasing to non-investment grade suppliers.

Buyer Centric Solutions

Buyer centric SCF solutions group three main instruments, according to the guide lines provided by the Supply Chain Finance Working Group Report [2010].

Purchasing cards

Under this system, the procurement card program is managed by a buyer on a monthly basis; for all charges made during the month, the funds are remitting to the payee within a few days of each charge. If the payer pays late, the service provider charges the interest on the open balance.

A procurement card program is an excellent tool for companies making payments to its suppliers because it simplifies the traditional expensive process of issuing purchase orders, matching receiving documents to supplier invoices and making check payments.

This instrument is very convenient with small and low-spend suppliers and provides buyers with solutions for ad-hoc expenditure.

Early pay programs and dynamic discounting

Many large companies have enough resources to self-fund early payments to their supply chain while others need financial institutions and technology service providers.

If transaction fees are set properly, it implies benefits for treasury functions and risk reductions over the supply chain.

Moreover these programs can equally offset costs of external financing within the several subjects, making the financial expenditure more sustainable.

In general these solutions are not convenient with larger suppliers because imply a very high financing rate, namely 1% to 2% of invoice value, equivalent to 18% to 36% of annual percentage rate[24].

SCF programs

This program is at the center of our classification and is specifically defined as SCF; a large buyer offers to its strategic suppliers the possibility to fund their working capital by leveraging its credit risk.

Therefore suppliers can get easy access to capital and pay an interest rate based on the buyer's credit standing and this is definitely cheaper; the basic idea is similar to reverse factoring, but in this case there are much more players involved and all the transactions are electronically processed,

Banks, funds, funds of funds, public authorities and other investors usually fund the operation and all the transactions are managed through high technological web-based platforms developed by banks or more frequently by SCF service providers.

SCF also strengthens supply chain relationships, offering a win-win situation and reducing the global risk of the network.

[24] Annual percentage rate (APR) describes the interest rate for a whole year and is calculated as: the rate, for a payment period, multiplied by the number of payment periods in a year. However the exact definition depends on the types of fees included.

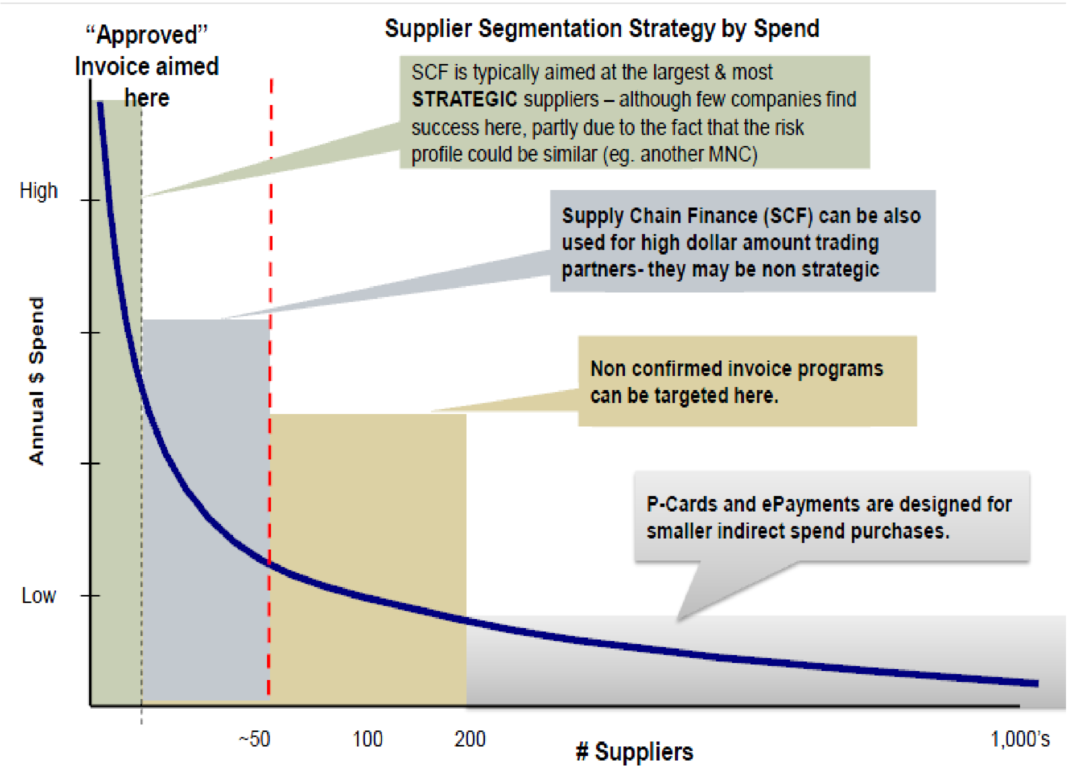

Figure 2.8: supplier segmentation strategy by spend.

Source: Global Business Intelligence Corp. [2012].

The figure above (figure 2.8) shows possible buyer-centric SCF solutions in relation to the features of suppliers.

Seller Centric Solutions

In supplier centric solutions, the seller drives the buyer's adaptation in exchange for longer payment terms; the only input required from the buyer is information on invoice approvals.

Considering the financial agreements, this case is simpler than the former because the negotiations are between the bank and just one seller.

The main difference with buyer centric solutions, which is also the biggest disadvantage, is the discount rate, which is based on the credit rating of the supplier; as a consequence the cost of financing is typically higher in this situation.

Supplier centric programs can be classified in two main categories, according to the guide lines of the Supply Chain Finance Working Group Report [2010].

Supplier driven receivables programs

These solutions are commonly known as factoring and invoice discounting; the suppliers sell their receivables to a bank or another financial intermediary and receive in turn the corresponding amount of cash less a discount, based on the supplier credit risk. In addition, there is another difference with the buyer driven receivables; in this case is possible to release early only 65% - 90% of the invoice value.

However, several suppliers use these quite expensive solutions to control their days sales outstanding and to reduce the overall supply chain risk.

Inventory financing

These solutions can be split in two categories; the first ones are provided by financial institutions and the second ones are self-funded by suppliers and buying organizations. This last option refers to consignment stock or vendor managed inventory schemes within manufacturing and production environment.

These practices allow purchasing organizations to decrease the cash tied up in stocks through a share-out with the suppliers; in this case there is no reduction in the overall supply chain risk, which is just shared among the players.

2.4.2 Pre-shipment vs Post Shipment Solutions

Another interesting classification is the one referring to events or triggers in the supply chain that can be used to release cash and to reduce the cost of financing for that chain. The reference is to a study[25] by Henke, Wuttke and Blome which contains an investigation about Financial Supply Chain Management[26] solutions based on relationships between focal firms and selected suppliers, aimed to evaluate the related

[25] The paper under examination is "Focusing the financial flows of supply chains: An empirical investigation of financial supply chain management" by David A. Wuttke, Constantin Blome and Michael Henke.

[26] Financial Supply Chain Management is a discipline overlapping those of supply chain management, corporate finance and risk management and represents a set of solutions and services to expedite the flow of money and data between trading partners along the supply chain.

effects on performances; the paper focuses predominantly on the management of short-term credit as related to liquidity in buyer-supplier relationships.

Before deepening in that classification, it’s important to remember that, in the context of financial supply chain management, the term SCF assumes a more specific meaning, referring just to a particular post-shipment practice which is based on an evolution of the reverse factoring; therefore this approach represent an alternative framework for the classification of the several available financing solutions, useful especially to provide a more structured clustering of the practices falling down the financial supply chain management.

Made this important clarification, it’s possible to identify two main categories; the purpose of both is to enforce weak working capital positions and to reduce the risk in upstream supply chains.

Pre-shipment schemes are based on planning, managing and monitoring cash flows along the supply chain taking place before the delivery, quality control and invoice release to the buyer; their scope is to improve physical flows in the upstream supply chain.

For example a large buying company could pay some selected suppliers a bit earlier, or advancing a percentage of the amount in order to facilitate them to produce or to improve the physical flow and to strengthen the relationship, as well as, in the closest collaborations, monitoring cash flows and paying supplier’s supplier.

These solutions require banks and other providers to have a deeper understanding of their customer’s supply chains and the relationship between buyers and suppliers.

Practices taking place after the delivery, quality control and invoice release are classified as post-shipment solutions; those imply that the buying firm actively manages cash flows, rather than simply demanding extended payment terms.

Considering this type of practices, it is common to use online platforms on which invoices are posted right after their releasing; in this way, suppliers have real-time visibility of the payments, from the day of delivery to the due date of payment terms.

So it is possible for sellers to plan with more confidence their cash inflows and moreover in some cases there is the opportunity to decide when receiving cash, depending on the financial needs and on the will to pay an interest or not.

Finally there is another important point to be considered; besides the benefit to receive cash more flexibly, the suppliers pay interest rates according to buying company's credit rating, which is usually much lower than the seller's one.

In this classification, the term SCF refers precisely to that approach and it differs from reverse factoring for its more holistic framework and for involving a broader set of suppliers (Focusing the financial flows of supply chains, Wuttke et al., [2013]).

In contrast to reverse factoring, SCF is increasingly efficient and effective in relation to the number of suppliers using the same platform and for this reason it requires a more structured management approach, by the implementation of a relationship with many sellers and a bank, instead of the sum of different disconnected buyer-supplier dyads.

This classification was made by relying on a sample of firms facing with weak working capital position[27], which can apply to the upstream supply chain, or the buying firm only, or to both.

Considering a large focal firm, it's important to specify that its decisions could heavily influence several other actors of the supply chain as a result of its size and its strategic significance; therefore it isn't sufficient reasoning and acting just in term of its own financial position, but it's critical to evaluate the situation of the whole chain.

For example, a strong buying company could exploit its potential power to extend its payment terms to suppliers and this is good from a financial point of view; on the other hand, from an operational perspective the firm could deal with problems arising from the loss of suppliers, struggling with unsustainable working capital position.

If the aim is to strengthen the supply chain as a whole, the logic has to be different; if suppliers face weak working capital positions but the buying firm does not, the preference should be addressed to pre-shipment solutions, otherwise the more a buying firm suffers from a working capital position in comparison to suppliers, the more it prefers to postpone cash flows and thus, the more chooses post-shipment practices.

Finally the last important topic of this approach concerns the effects of pre-shipment and post-shipment solutions on the upstream supply chains, since reasoning in term of multi-tier suppliers is becoming more and more critical.

[27] Here, working capital is defined as the difference between current assets and current liabilities.
The working capital position is considered weak if it is too low or too high; in the first case we are talking about liquidity risks, in the second the problem is the inefficiency.

The empirical results collected in the paper report that a supplier, receiving money early through pre-shipment practices, might more likely agree to advance payments to its suppliers facing the same situation and consequently.
On the other hand, this is not possible with post-shipment solutions since they leverage the larger size and the higher credit rating of focal companies but are not able to provide the same power to the suppliers, which in turn can just enjoy the flexibility to decide when receiving cash.
Nevertheless, it's typical that liquidity shortages are transmitted in the upstream supply chain, therefore the implementation of post-shipment schemes by focal companies mitigates this effect further up the supplier's suppliers.
The figure below (figure 2.9) provide an interesting general framework of financial supply chain management, by representing this discipline as an intersection of supply chain management, corporate finance and risk management; then it aims to classify the several financing solutions in different clusters, two of which represent pre-shipment and post-shipment practices.

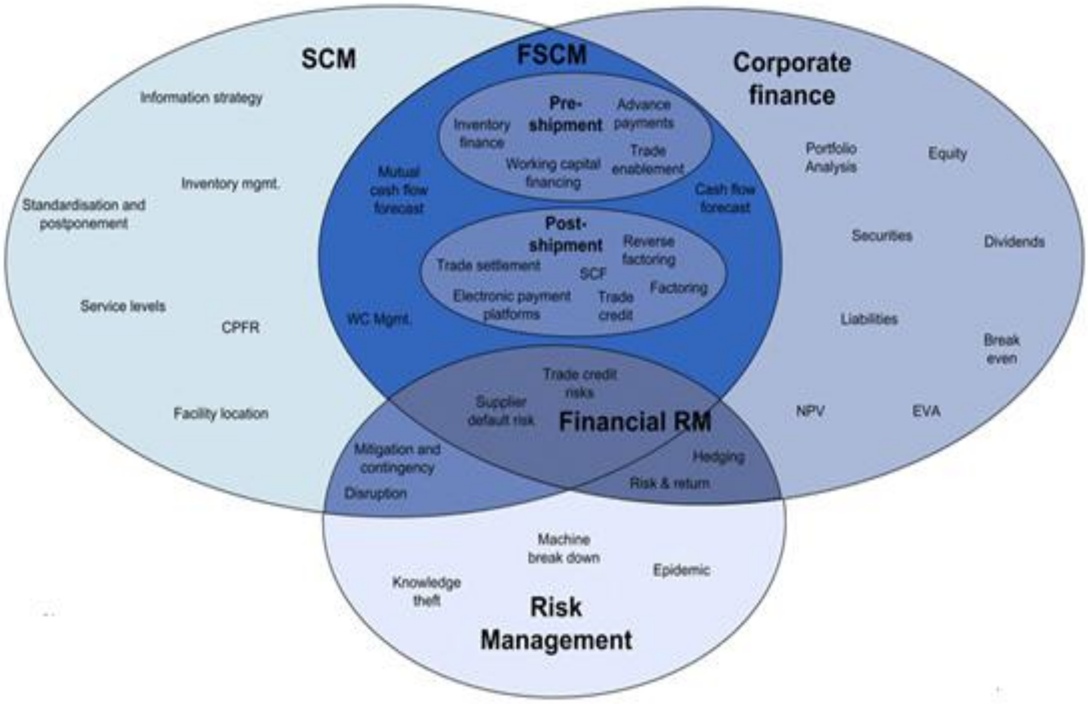

Figure 2.9: Financial supply chain management classification.

Source: Henke, Blome, Protopappa-Sieke, Wuttke, [2013].

2.4.3 Traditional, Innovative and Collaborative Solutions

Another relevant classification is the one referring to the distinctive features of the SCF solutions; the reference is to the research carried out by the Osservatorio of Supply Chain Finance[28], Politecnico di Milano [2013].

This study identifies three main categories of practices; the common feature to all these solutions is the presence of ICT, which in some cases has just the role to make the transactional processes more efficient, while in others acts as an enabling factor.

Traditional solutions

The majority of these practices are known and already available, but the level of development is not uniform among the European countries.

These solutions provide firms with additional opportunities to access to short-term capital; in most cases they are based on an individualistic logic, focusing on the key financial and operational indicators of single companies.

The SCF approach aims to reinterpret these practices considering the importance of the sustainability of a supply chain as a whole.

Just to grab a general idea of this category, it’s useful to underline that all these tools are enabled by submitting a document ensuring the existence of a business relationship between the parts; in general, these documents are the invoices[29].

In this context the role of ICT is usually to improve the efficiency of the processes; technology platforms of integration and communication make available more information, increase the control and reduce the costs.

Invoice Discounting

The invoice discounting is a short-term borrowing used to improve a company’s working capital and cash flow position; this instrument enables firms to be paid earlier than waiting for clients’ payment terms.

---

[28] The “Supply Chain Finance Osservatorio” of Politecnico di Milano School of Management was established in 2013 to satisfy the increasing interest of firms and Public Administrations to the opportunities of working capital optimization and access to credit provided by supply chain finance solutions. The Osservatorio is also part of the International Supply Chain Finance Community (ISCFC), which aims to share and improve analysis and researches at the European level.

[29] An invoice is a commercial document issued by a seller to a buyer, relating to a sale transaction and indicating the products, quantities and agreed prices for products or services the seller has provided to the buyer. The invoices close the commercial-logistic cycle and open the administrative-accounting cycle. It’s very common these documents are transmitted electronically and the most popular standard is the EDI, electronic data interchange.

It takes place with a supplier contracting a debt with a bank, in order to fund an account receivable; the invoice is sold to the financer and represents a pledge.

In this way it is possible to offer favorable contractual terms to the clients and, at the same time, to finance the net working capital through a short-term debt.

This financing scheme allows suppliers to release on average the 80% of the nominal value of invoices and the related interest rate varies in a range of 5%-10% for year.

This form of financing is common but in recent times it is getting more efficient through the adoption of ICT technologies; a significant example is the electronic invoicing[30].

A general scheme of this practice is reported below (figure 2.10), with a particular reference to an international trade example.

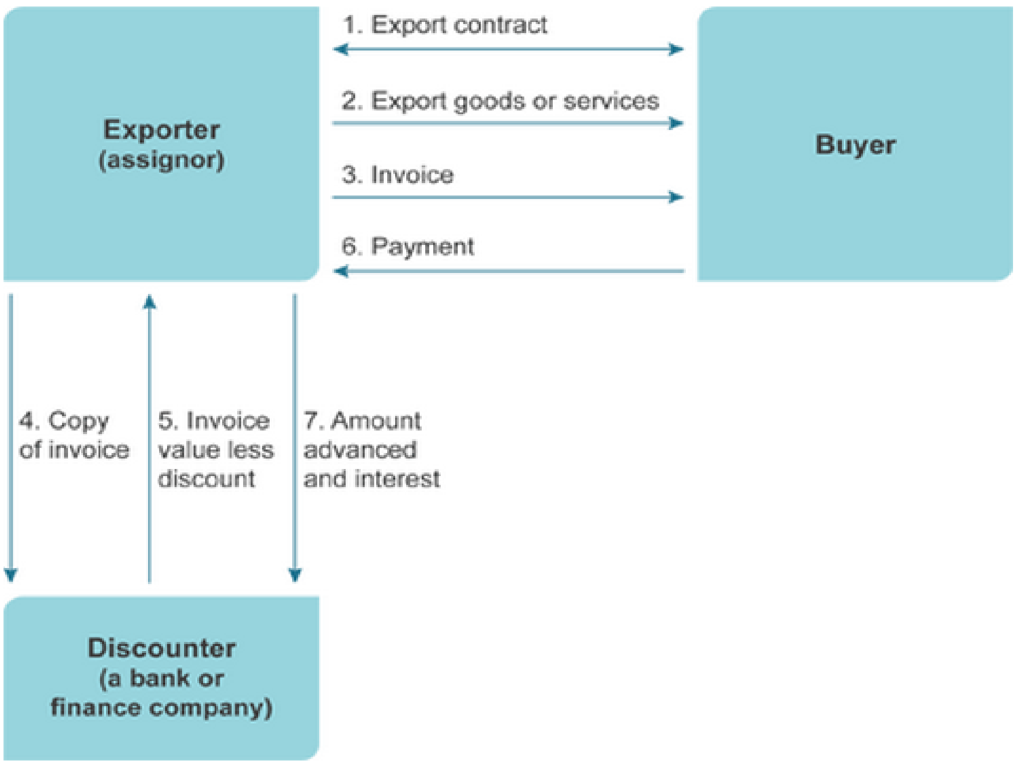

Figure 2.10: an example of international invoice discounting.

Source: EFIC Finance for Australian Exporters.

[30] The electronic invoicing methods are used by trading partners to present and monitor transactional documents and ensure the terms of their trading agreement are being met. These documents can be exchanged in a number of ways including EDI, XML, CSV and they are usually uploaded using web applications. This form of information management is very useful because it's possible to centralize all documents in one location on a web server and to have invoices automatically routed for processing.

Factoring

Factoring is a scheme in which suppliers sell their account receivables to a factor company[31] at a discount, generally based on an interest plus a service fee, and receive immediate cash (Klapper [2006]); it's not a loan and there are no additional liabilities on the firm's balance sheet.

It's less common than invoice discounting because it generally requires high volumes of transaction to be adopted, between 2 and 5 million of €.

There are two types of factoring, pro-solvendo and pro-soluto: in the first one the factor company has the right to claim against the assignor of credits in case of non-payment by the debtor, on the contrary in the second one the factor takes the risk on itself.

As a consequence, pro-solvendo solutions imply a lower total cost, based on the sum of interests on the eventual anticipation granted by the factor and the management fees, which are calculated in relation to the amount of credits sold (Giudici [2010]).

On the other hand, pro-soluto solutions are more expensive, considering the remuneration for the guarantee service; in a similar situation, the factor has to deal with problems of asymmetric information (Sopranzetti [1998]).

As explained in a paper by Sopranzetti[32], a moral hazard problem takes place when the seller's credit management efforts are unobservable to the factor; once the entire receivables is sold, the seller has no incentive to keep monitoring.

So a rational factor expects suboptimal monitoring efforts and reflects this belief on the equilibrium price, which is higher than the other modality.

The main feature of factoring is that the underwriting is based on the account receivables' risk rather than the seller's, which is usually a SME with a high risk credit rating (Klapper [2006]).

Furthermore, a similar contract can also provide additional services: credit insurance, billing services, credit recovery and credit services, which basically are based on assessing the creditworthiness of the seller's customers.

The factor typically advances less than 100% of the nominal value of credits, even though it takes ownership of the entire receivable and that difference is a reserve held

[31] Factor companies are financial institutions which specialize in the business of account receivables management. If a factor chooses to purchase a firm's account receivable, then it will the firm a pre-negotiated discounted amount of the face value of the invoices.

[32] The reference is to the paper by Ben J. Sopranzetti, "The economics of factoring account receivables", published on "Journal of Economics and Business", 1998.

by the factor in case of payment's deficiencies; for instance, a factor can fund up to 70% of the account receivable's value and return the other 30%, less interests and fees, in case the payment is received from the buyer (Klapper [2006]).
Factoring can be done on either a notification (figure 2.11) or non-notification basis, which implies or not that a buyer is notified when its payables are sold to a factor.

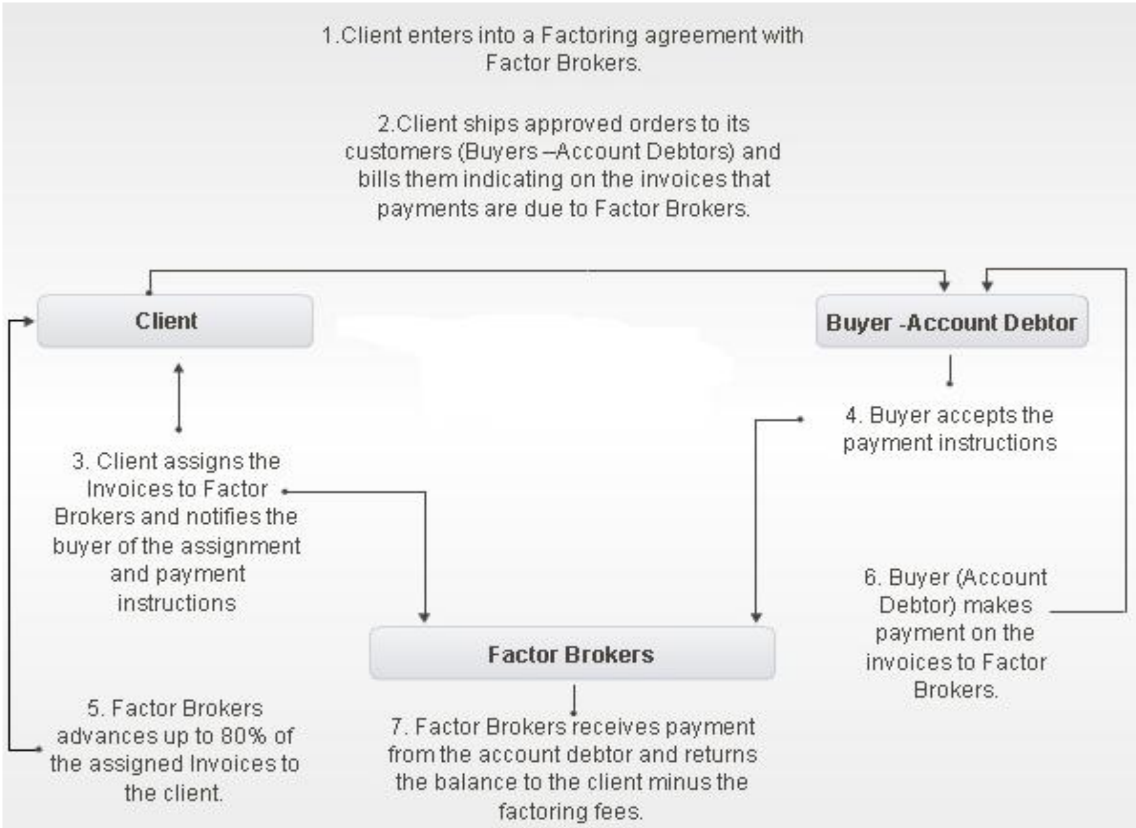

Figure 2.11: how factoring works, with a reference to the notification modality.

Source: Factor Brokers Inc.

Reverse Factoring

In this scheme, the buyer signs a framework agreement[33] with a factor company, which is responsible to contact the suppliers and liquidate their invoices; the cost of the service

[33] A frame work agreement is a contract between legal or physical entities that regulates a form of collaboration. This type of contract usually establishes just the main principles, leaving autonomy to manage the single cases.

is negotiated by the buyer, which is usually a large creditworthiness transparent high-quality company, less risky than its suppliers (Tanrisever et al. [2012]).
The solution can be pro-solvendo and pro-soluto, which is clearly prevalent; the impact on liquidity and net working capital is the same of factoring.
The cost is lower than factoring and varies from 2,5 % to 5% a year, depending on the modality and the rating of the buyer.
The factor needs to collect credit information and calculate the credit risk for selected buyers, such as large, internationally accredited firms; the main benefit is that the credit risk is equal to the default risk of high-quality customers. Other benefits are reported below:

- Reverse factoring doesn't require credit information on the client's suppliers;

- Reverse factoring provides benefit also to factors, which are able to develop relationships with small firms serving high quality buyers, without taking on additional risk. This provides cross-selling opportunities and the possibility to build a credit history on the small suppliers without excessive efforts;

- Reverse factoring allows suppliers to obtain cash and fund their working capital easier and cheaper; at the same time the buyer can negotiate better terms with its suppliers and simplify the management of payables, since the factor acts like a single interface for all suppliers.

The IT enhancements of reverse factoring can significantly increase its effectiveness and efficiency; electronic and web-based platforms provide more structured and codified information and can offer these solutions to a sharply broader base of suppliers. It is reported below a typical reverse factoring scheme (figure 2.12):

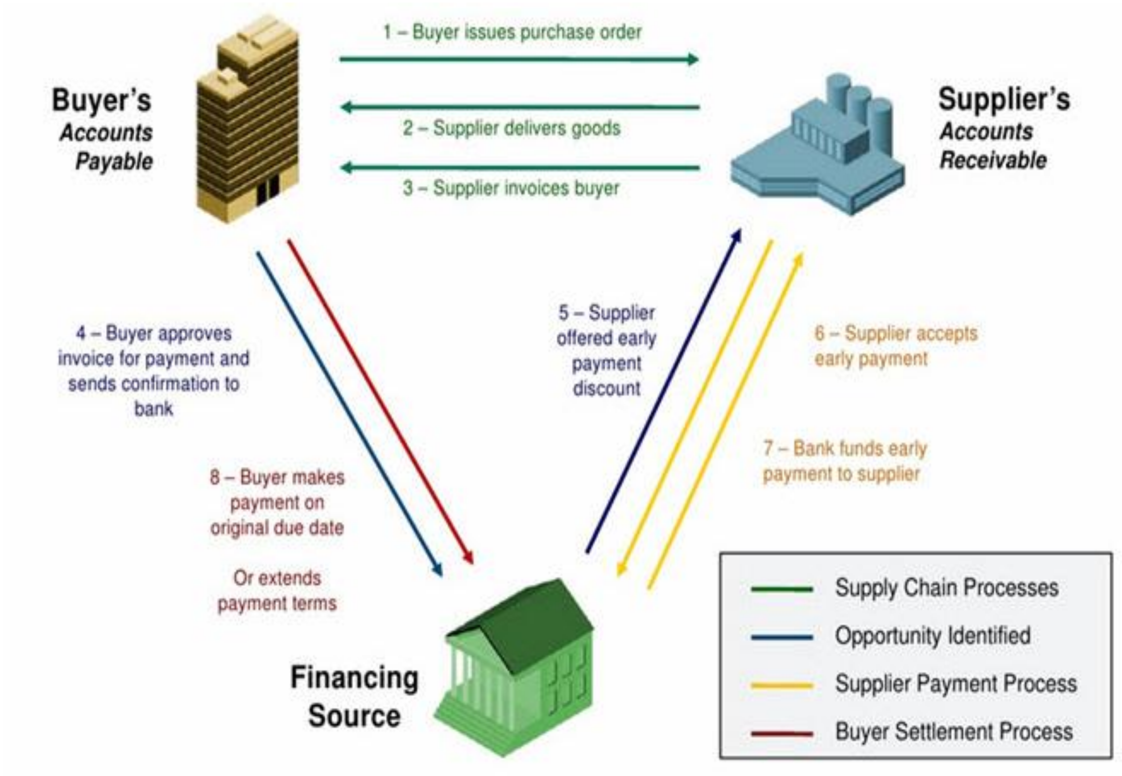

Figure 2.12: a reverse factoring scheme

Source: Supply Chain Finance Community.

Innovative solutions

These financing schemes, not very common yet, are based on digitalized processes trying to fully exploit the potential of new technologies; the aim is to make available several opportunities of collaboration which integrate supply chain subjects, financial institutions, logistic operators and IT providers.

In a similar context the role of technology starts to gradually evolve from a supporting function to an indispensable and enabling factor for the business development.

These instruments could be really helpful especially for the SMEs, which are looking for new opportunities of working capital financing.

SMEs have to deal with bad payment conditions because the buyers usually exploit their bargaining power to postpone cash outflows and improve their individual financial indicators; in that way the sustainability of supply chains as a whole decreases.

Sometimes the implementation of similar schemes is expensive, especially if a financial intermediary is included; as a consequence SMEs can hardly apply and often these solutions are available for those who need less.

In that view the governmental support may be critical; it's possible to rule the tools, fund the best projects and strongly sponsor the engagement of the bigger buying company even through incentives for granting better conditions to small suppliers (Purchasing Insight and Procurement Processes, gov.uk).

That is slowly happening in the United Kingdom, where the government of David Cameron is focusing on regulatory actions in favor of this type of SCF solutions.

The aim is to help smaller firms in improving their working capital and tackling the issue of late payments and bigger players in expanding the business and strengthening supply chain relationships.

In addition, the British government also built its own SCF scheme with its own suppliers[34], in collaboration with the British Banker's Association, (Multi-billion boost for UK supply chain to get business growing, gov.uk).

Advanced Reverse Factoring / SCF

It's the innovative version of reverse factoring; this solution, also known as SCF, makes available much more operational information to evaluate the several parts involved.

This scheme can be implemented only through the adoption of advanced IT tools; an example can be a technology platform supporting all processes of reverse factoring financing, from the relationship between a large buyer and its small suppliers, to the presence of a financial institution (Global Business Intelligence [2012]).

The digitalization is aimed to manage a high volume of structured information, from the documentation related to all business transactions to the buyer's vendor rating system[35], which is useful to have a clear overview of suppliers but it's very difficult and computationally heavy to manage.

This is particularly suitable for a large buyer with a really wide base of small suppliers, which is the typical situation for which the advanced reverse factoring is built.

[34] The reference is to the SCF schemes adopted by the British government with the National Health Services (NHS) pharmacists.

[35] A vendor rating, also known as a supplier rating, is based on a formal system of evaluating the companies that supply materials or services to an organization. The process is meant to encourage a high-quality, efficient vendor-to-customer relationship. An organization will usually evaluate the overall vendor experience, including the quality of service, the timeliness of delivery, the quality of the product type, and the accuracy of the amount delivered.

Financial institutions can rely on more relevant information without sustaining great interface efforts and consequently their operational and credit risk is easier to be kept under control; on the other hand, the buyer can monitor its working capital position and at the same time reduces the probability that some of its suppliers suffer from liquidity crisis or default.

SCF is not common yet and is offered mainly by global banks or other big financial intermediaries; the technology platforms necessary to build a similar scheme can be developed by the bank itself or, more frequently, by specialized technology providers.

The figure below (figure 2.13) reports an innovative SCF solution offered by Bank of America Merrill Lynch[36], which is very similar to an advance reverse factoring.

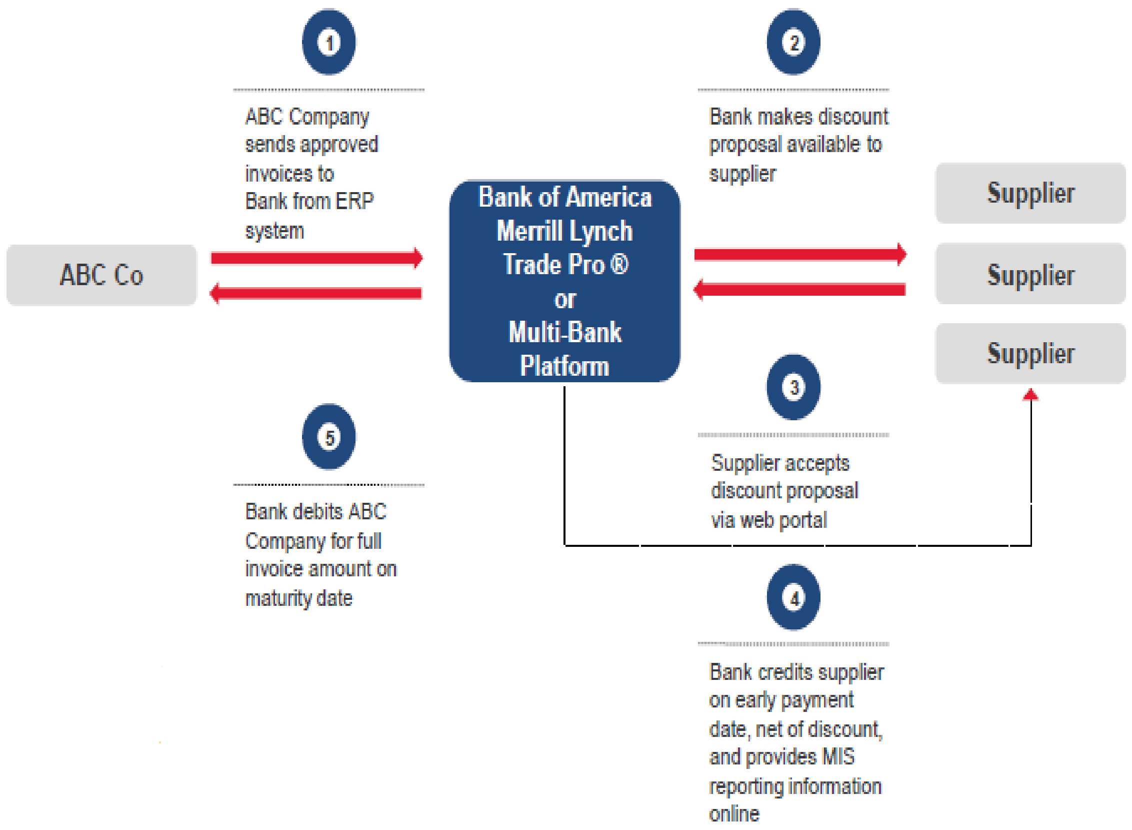

Figure 2.13: a graphic representation of SCF solution

Source: Bank of America Merrill Lynch.

[36] Bank of America Merrill Lynch is the corporate and investment banking division of Bank of America. It provides services in mergers and acquisitions, equity and debt capital markets, lending, trading, risk management, research, liquidity and payments management, supply chain finance.

Dynamic Discounting

This solution allows a supplier, according to a buyer, to obtain anticipated payments in exchange of discounts on the nominal value of invoices; the discounts are dynamically variable, proportionally to the anticipation granted by the buyer.

The maximum discount is obtained in case of prompt cash payment, and then it linearly decreases day by day until zero, in case of payment on deadline.

Dynamic discounting is aimed to balance the net working capital of the supply chain as a whole, considering the liquidity needs and the cost of capital of all actors; the buyers can get larger discounts when their liquidity position is safety or when suppliers are heavily looking for liquidity.

This solution solves the problem of "take-it-or-leave-it" of the traditional invoice discounting, in which there is no possibility to reconcile in a flexible way the needs of parts; is reported below (figure 2.14) an example of how is difficult for buyers to capture discounts (Paystream [2011]).

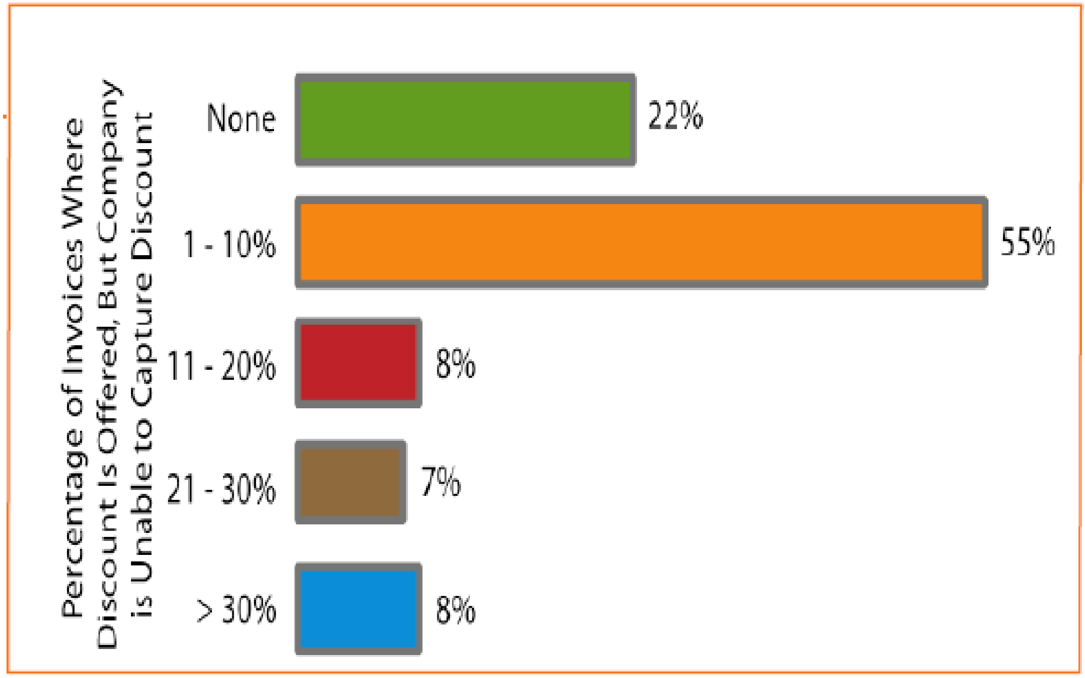

Figure 2.14: % of firms interested in discounts in relation to the % of missing discounts.

Source: Paystream Advisors [2011].

The survey[37] by Paystream considers a sample of companies for which early payments are very important; just 22% is able to capture all available discounts.

The figure below (figure 2.15) reports the difference between a traditional invoice discounting and a linear dynamic discounting solution.

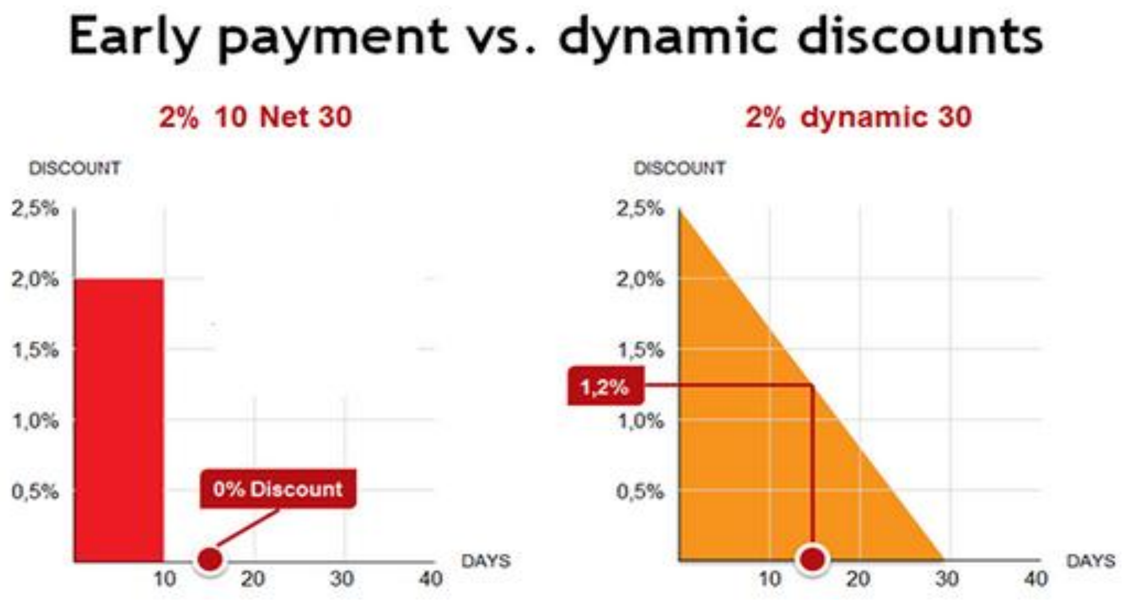

Figure 2.15: traditional invoice discounting vs dynamic discounting.

Source: elaboration of the author from Medius Group.

Considering the same early payment, the buyer doesn't get a discount with traditional invoice discounting, while collects a discount of 1,2% of the invoice value in case of dynamic discounting (Dynamic Discounting Opportunities, Medius Group [2011]).

This innovative scheme allows buyers and suppliers to negotiate terms, setting different models of implementation and inviting or not third-party funders to participate and finance the operation.

There are three types of dynamic discounting (Paystream [2011]):

[37] The reference is to the survey of Paystream Advisors of November 2011, published on the document "Dynamic discount management, finding the treasure in Treasury" [2012].

- Sliding scale discounts: it’s the most common solution, in which the discount is calculated as a function of the time of payments, constrained in a range of a maximum and 0;

- Third party financing: these solutions refer to banks and receivables trading platforms; the banks provide buyers with capital to pay the suppliers before the due date and receivable trading platforms allows sellers to place their invoices in the open market to be traded by hedge funds and private lenders;

- Marked-based price discovery: this modality facilitates matching supply and demand.

Early payments solutions are more effective when the invoices are approved quickly, and this is achievable through technology enhancements.

Clearing House

This solution is an evolution of reverse factoring involving a larger number of actors; it concerns a wide ecosystem of companies and reaches its maximum effectiveness when several suppliers are reconciled with several buyers.

In general, traditional reverse factoring or SCF solutions include one or more suppliers, and only one large buyer; the clearing house solves the difficulties related to a more complex universe of firms and at the same time leverages all its potential advantages. In addition another player is involved in the scheme; the high complex set of commercial and operational relationships and its consequent effects are ensured by an entity playing the role of guarantee, which might be a financial institution or a subject supported by a financial institution.

The function of this entity is to balance the payment streams over time by acting as a decoupling point between buyers and suppliers; since the various subjects have to deal with liquidity needs in different periods, this solution facilitate an intelligent distribution of financial flows among the several players, depending on their condition.

A clearing house expresses its maximum potential in dynamic and complex environments, with a multitude of buyers interacting with a multitude of suppliers.

A similar solution is achievable only through technology enhancements, necessary to manage in a structured and flexible way a really heavy volume of information.
The cost of capital of the several players depends on the features of the ecosystem, on the relationship between actors and on the role of the financial institution and of the other entity acting as guarantee; the mechanism is not different from a classical clearing house managing the financial transaction of an organized stock exchange.
Its function of netting offsetting transaction between multiple counterparts serves as a facilitator for matching supply and demand and especially as a tool of risk reduction.
Moreover by using the technology, the guarantee can also act as an information provider and monitoring the creditworthiness of the several buyers and suppliers involved in the ecosystem; the figure 2.16 reports the mechanism of a SCF clearing house:

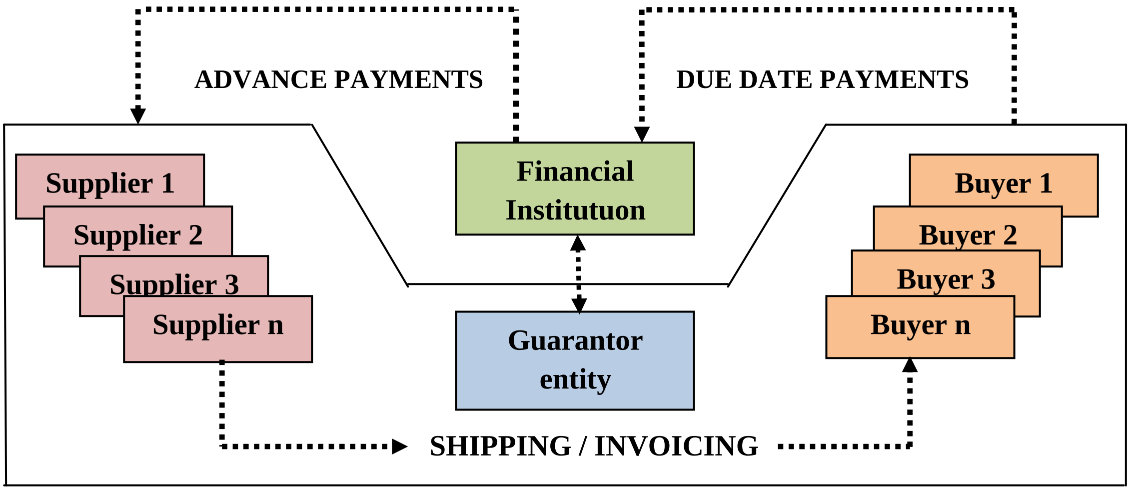

Figure 2.16: a typical scheme of a SCF clearing house

Extra Bank Invoice Discounting

This solution is based on the same principles of invoice discounting, but its implementation widens the traditional bank-firm financing scheme.
It's possible for a third party to invest in a new structured financial product based on invoices of firms which can be built in several different ways.
There are two main innovative aspects characterizing that solution: the first is the so-called receivables trading, which makes possible to commercialize the invoices on a real organized market; the second regards the third party involved in the scheme, that is no longer reserved to banks but includes other companies, public administrations, funds,

funds of funds, privates and all other actors which have capital in surplus and would like to invest in a low-risk, short-term product.

The mechanism is similar to the crowd-funding and requires a web-based technology platform developed by specialized operators, which in general take the role of guarantee and of market organizer; in general the invoice exchanges happen through auctions which are not open to any player.

Indeed the guarantee has the monitoring responsibility and for this reason makes a sort of evaluation of the firms selling invoices and the potential buyers.

For this services these operators receive a fee on each transaction, that varies in a range of 0,5%-1,5% of the nominal value of advanced invoices; an example of how this mechanism works is reported below (figure 2.17):

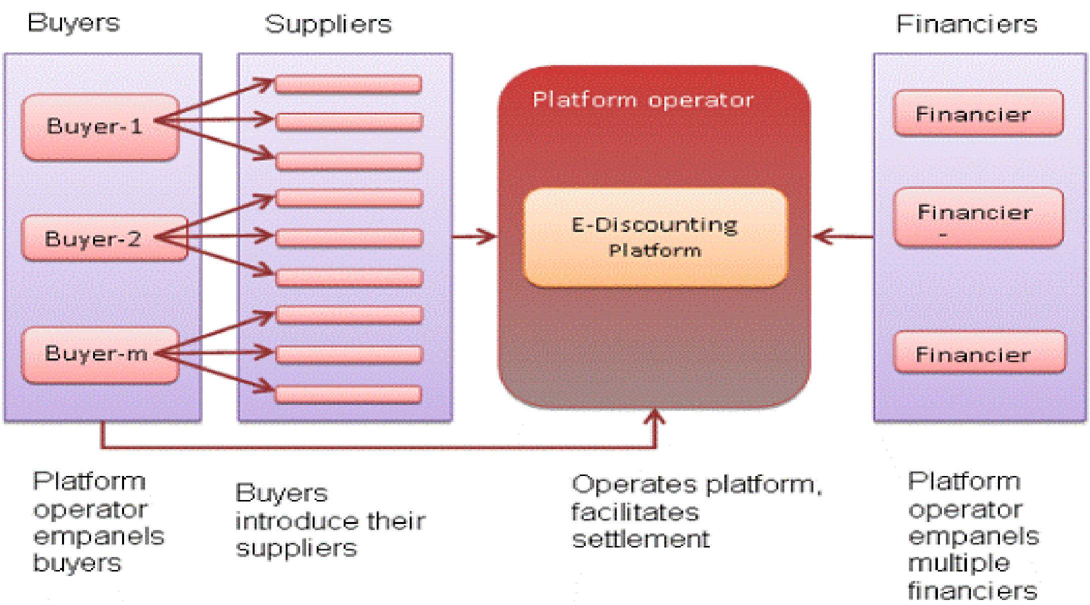

Figure 2.17: a web-based platform for extra-bank e-invoice discounting

Source: Reserved Bank of India.

The platform operator organizes the auction through which supply and demand are matched; suppliers ask a percentage of invoices to be advanced and the financiers require information and fees. When buyers pay on the due date, suppliers refund the third parties, which get a fee based on the credit risk of the contractor, on its financial performances and on its previous experiences on the platform.

In fact the platform manages a huge volume of information through which is possible to build a track record of each firm and assign indicators of creditworthiness.

The percentage of released invoices depends on the auction and on the reliability of the parts and is included on average in a range of 75%-90% of the invoice nominal value.

These solutions were designed for the SMEs and so far have found application in countries where the financial markets are more developed; the reference is to the market-oriented[38] countries, like United Kingdom and United States.

Collaborative solutions

These solutions are based on frameworks already known for several years and they are primarily addressed to optimize inventory working capital[39] (Hofmann et al. [2010]).

Some of those are already digitalized, but there are other more traditional schemes which could be modernized and reinterpreted by applying new digital technology.

The growth of enterprises is not driven anymore by internal motives only; a significance number of external factors are becoming critical and, as a result, many forms of alliances are developing to break down intra and inter enterprise barriers.

Closer relationships enable partners to achieve cost reduction and revenue enhancements as well as flexibility in dealing with supply and demand uncertainties; these collaborative practices represent a continuum from a simple exchange of basic information and mutual visibility to a more elaborate level of experience sharing risks and profits (Derrouiche et al. [2014]).

A relevant definition of supply chain collaboration is reported:

Simatupang and Sridharan [2005][40] define it as:

Two or more enterprises working together to create a competitive advantage and higher profits that cannot be achieved by acting alone.

---

[38] The attribute market-oriented is linked to the financial system; in marked-oriented financial systems, securities markets share center stage with banks in getting society’s savings to firms, exerting corporate control and easing risk management.
This approach is typically prevalent in Anglo-Saxon tradition countries.

[39] Inventory and working capital has a symbiotic relationship in business; the basic working capital formula is current assets minus current liabilities, with inventory being part of a company’s current assets. Most companies use account payables to pay for new inventory purchases, therefore inventory affects working capital on both sides, assets and liabilities.

[40] The reference is to the study “Supply chain discontent” [2005], by Togar M. Simatupang and Ramaswami Sridharan.

These two authors also developed an important empirical study on supply chain collaboration; the first contribution of the study[41] is the demonstration that supply chain collaboration can be measured using decision synchronization, information sharing and incentive alignment, which contribute to fulfill performances (figure 2.18).

Information sharing and decision synchronization enable chain members to have a global perspective and take decision jointly, like collaborative forecasting, ordering and delivery; incentive alignment encourages chain members to pursue mutual strategic objectives that yield better profits to all actors.

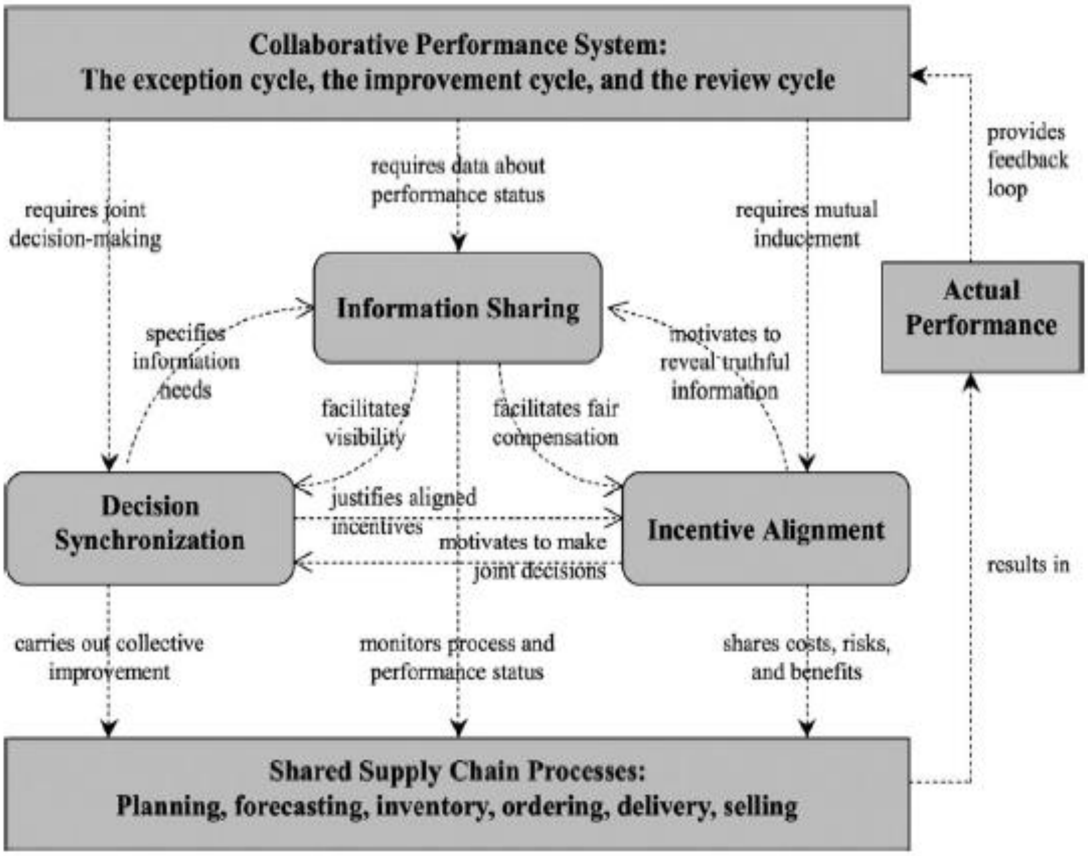

Figure 2.18: An empirical study of supply chain collaboration.

Source: Simatupang and Sridharan [2004].

[41] The reference is to the empirical study by Togar M. Simatupang and Ramaswami Sridharan "Managerial views of supply chain collaboration, an empirical study", published on Gadjah Mada International Journal of Business [2009].

Vendor Managed Inventory (VMI)

This practice is an integrated and collaborative approach whereby the inventories of firms, which can be a retailer or distributor, are monitored and managed by a supplier or a group of suppliers; since it requires challenging efforts from both parts to achieve significant results the vendor managed inventory is implemented when the business relationship between the partners is really interdependent and indispensable.

A significant definition of Alberto and Zamolo[42] [2005] define VMI as:

The highest level of partnership where the vendor is the primary decision-maker in order placement and inventory control.

Under a similar system, the supplier establishes the appropriate inventory levels of each products and the appropriate inventory policies to maintain these levels, making reference to the previously agreed upon bounds (Derrouiche et al. [2008]).

It's important to consider some interesting aspects[43] (Dong and Dresner, [2008]).

The information sharing allows suppliers to plan their activities by exploiting a much larger visibility of all significant downstream processes, since the clients make available a set of information that is usually kept confidential under other practices; as a result of that suppliers can significantly reduce the inventories and therefore the net working capital. It's also possible to reduce the stock-out risk and to limit the speculative purchasing and, at the same time, an impressive reduction in the transport costs is achievable through the possibility of better saturating the transportations.

Assigning the inventory decisions to the suppliers can improve clients' performances: firstly, if a manufacturer serves multiple retailers is possible to prioritize the shipments, so that clients with a lower inventory level are resupplied before; secondly, the fulfillment planning may be improved since suppliers have information about their own production capacity.

Finally, since in general a manufacturer is larger than its distributors and has more resources, it may be able to forecast demand and plan inventory with better capabilities.

Another important aspect to mention is the bullwhip effect[44]; if a distributor places its own orders, it may over-order if there is uncertainty about supplier's capacity.

---

[42] The reference is to the the paper "Supply chain management: a framework to characterized the collaborative strategies", by R. Derrouiche, G. Neubert and A. Bouras [2008].

[43] The reference is to the paper "Beyond information sharing: an empirical analysis of vendor managed inventory" by Y.Dong and M.Dresner [2013].

This increases the order variability, thus is transmitted upstream more amplified; if the supplier controls inventory decisions, order quantities are not distorted and the bullwhip effect is mitigated (Govindan [2013]).

From the client's point of view other benefits are safety-stocks reductions, more revenues and reductions of net working capital; on the other hand, the administrative costs are moved to the supplier, which see a significant rising of order management expenditures (Lee and Cho [2013]).

An example of vendor managed inventory is report below (figure 2.19):

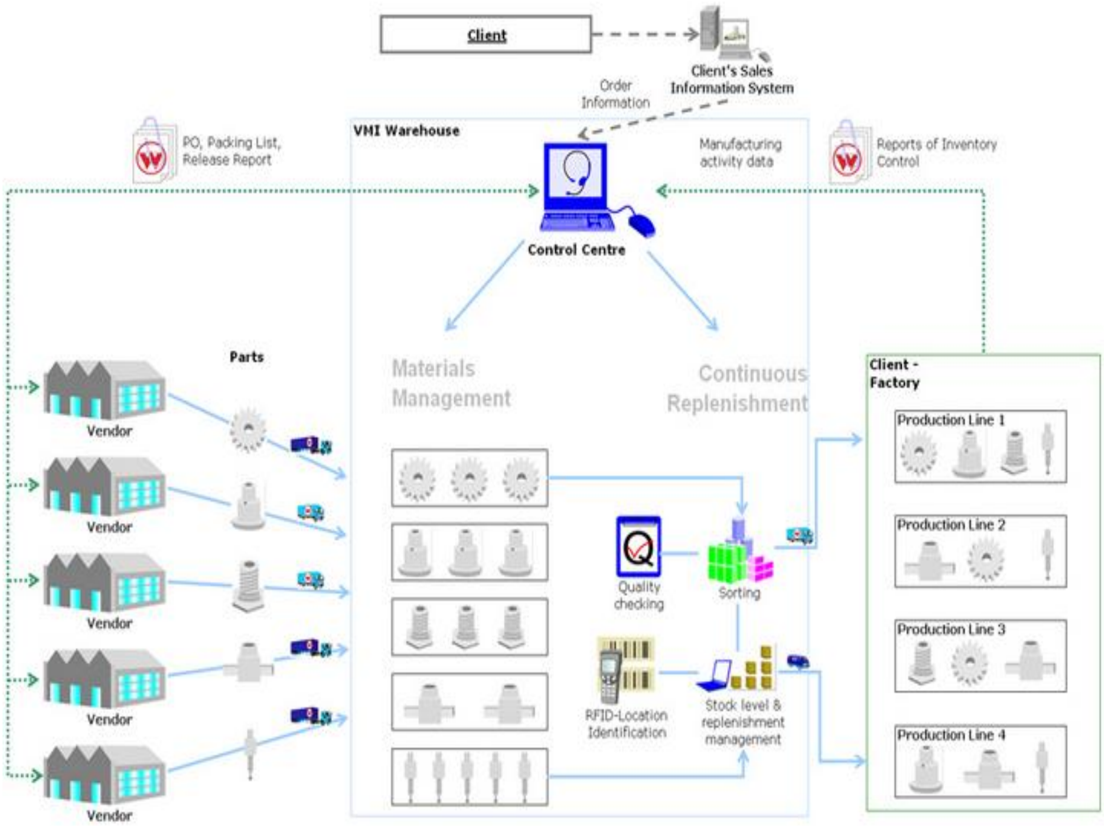

Figure 2.19: a complex vendor managed solution.

Source: EWW Logistic Specialist.

[44] The bullwhip effect, also known as Forrester effect, is an observed phenomenon in forecast-driven distribution channels. It refers to a trend of a larger and larger swings in inventory in response to changes in customer demand, looking at firms further back in the supply chain.

Moving up the supply chain from end-customer to raw material suppliers, each supply chain participant has greater observed variation in demand and thus greater need for safety stocks; moreover the described effect can lead to either inefficient production and excessive inventories or, alternatively, there is still the hazard of stock-outs, resulting in poor customer services and damaging public image and loyalty.

This figure reports a vendor managed inventory practice applied in a supply chain with a large focal company manufacturing different products and managing several upstream relationships with suppliers and downstream with buyers; as illustrated the management of its raw materials is based on different VMI solutions with each related supplier.
The solution has to be properly implemented, satisfying a minimum level of transaction and respecting all the constraints; in this case it's possible to achieve a win-win situation in which the advantages are distributed on all players.
The distributor's sales increase due to the reduction in stock-outs, the seller's sales also increase as a result of a rising in the customer service level and moreover, the rotation index of both actors significantly improves, leading to all consequent benefits.

Consignment Stock

It's an innovative collaborative inventory management approach in supply chains (Battini et al. [2008]); this practice is quite common and is acquiring growing importance in the industrial environment.
In a consignment stock solution the supplier guarantees the downstream company the continuity of a determined amount of stocks between a minimum and a maximum level, according to the agreement previously signed by the two parts; inventories are stored in the raw material (or semi-finished product) warehouse of the client, close to the production lines (Valentini and Zavanella [2003]).
On the other hand, the client can withdraw the materials as he wishes, according to its needs and the payments are originated only when those are utilized or sold to the final customers; in other words, the ownership of stocks stored in the client's deposit remains of the supplier until the client does an action, which is previously specified in the contract and in general relies on using or selling the goods and materials (Valentini and Zavanella [2003]).
A critical role is played by the information; since the supplier has to guarantee a continuous availability of materials, the client provides a really large set of information and grant complete visibility on the consumption trend, which is constantly refreshed and immediately transferred to the supplier.
In that way the client is protected against demand fluctuations and the likelihood of stock-outs decreases; moreover, if there were a stock-out, the agreement may establish

penalties for the supplier and in this case the opportunity costs would be null or very limited for the client (Persona et al. [2007]).

From the supplier's point of view, it's possible to have a better perception of his customer's requirements and therefore to reduce the stocking costs and to increase the its level of service, with all consequent arising benefits such as growing revenues or increasing marginality (Persona et al. [2007]).

Through information sharing, the continuous evolution of the market demand is perceived by the seller, who sees a reduction in its production planning efforts and a decrease in demand forecasting costs; moreover the client can benefit from more precise forecasting by dealing with less shortage of materials, late deliveries and stock-outs.

A similar provisioning policy may contribute to enforce the supply chain relationship and to strengthen the link between the client and its supplier, with all consequent benefits arising from a more collaborative and flexible business management (Valentini and Zavanella [2003]).

This solution is useful also in a perspective of supply chain sustainability, since the supplier maintains the ownership of goods until the client sells them in its turn; this leads to the supplier's working capital increase but, at the same time, represents an important support to all the small distributors and retailers.

In fact the seller may also benefit from a rising market share, since the financial benefits are an incentive for clients to push its supplier's products towards the final market; in that way the supplier acts to minimize the bankruptcy risk of its strategic downstream partners and, in turn, is able to get larger medium-long term advantages.

A meaningful paper from Valentini and Zavanella [2003] shows some important consignment stock's fundamentals[45].

The idea of consignment stock is to let the client's deposit stocks freely fluctuate between a minimum required level s and a maximum permitted level S, previously defined in the agreement; this amount of goods and materials are owned by the supplier until their consumption, even if are stored in the client's warehouse.

The cost's structure is completely different from tradition solutions; the unit inventory cost is affected by two components, the financial one h_{fin}, which represents the

[45] These considerations are based on the paper "The consignment stock of inventories: industrial case and performance analysis", by Giovanni Valentini and Lucio Zavanella [2003].

opportunity cost of investing resources to produce goods, and the storage one h_{stock}, which concerns with storage, insurance, movements and deterioration costs.

In traditional solutions both parts sustain the sum of the two costs, while the goods are stored in their deposit; however in general the sum h_{fin}+h_{stock} is greater for the client since the opportunity cost increases down the supply chain. The difference of a consignment stock scheme takes place when materials have already been delivered to the client; in this case the client sustains only the storage cost, because the goods are formally purchased only after their consumption.

Considering the same h_{stock} for client and supplier and a similar average stock level, the consignment stock's total cost is lower (as it's assumed h_{fin} larger for the client), even if a part of the cost is shifted on the supplier.

A schematic illustration of the described situation is reported above (table 1.1 and 1.2):

Relevant inventory costs in traditional agreements

		Position of raw material	
		Supplier	Company
Relevant costs	Supplier	$h_{s,fin} + h_{s,stock}$	0
	Company	0	$h_{c,fin} + h_{c,stock}$

Table 2.1: inventory costs in a traditional solution.

Source: elaboration of the author from Valentini [2003].

Relevant inventory costs under CS policy

		Position of raw material	
		Supplier	Company
Relevant costs	Supplier	$h_{s,fin} + h_{s,stock}$	$h_{s,fin}$
	Company	0	$h_{c,stock}$

Table 2.2: inventory costs in a consignment stock solution.

Source: elaboration of the author from Valentini [2003].

As illustrated, the inventory cost is the same when the materials are at the supplier position; on the other hand, when the goods are at the client step, consignment stock transfers a part of the cost to the supplier, but the total cost for the system is low.

Collaborative planning, forecast, replenishment (CPFR)

It's the most complex and complete collaborative solution implemented by a client and a supplier; it is a general joint planning over the medium-long term between the two parts, aimed to reduce forecast errors and inadequate replenishments.

In a CPFR both players work like two business units of the same integrated entity and it's possible to exploit all the several advantages arising from economies of scale[46], economies of learning[47] and mutual learning.

This integrated perspective provides firms with a broader vision of the supply chain and makes possible a mutual transfer of knowhow and skills; the most important result is the reduction of the net working capital of the whole chain.

This solution is very complicated and time consuming, since it requires heavy mutual investments and a not completely predictable profit margin; it's necessary to spend time and efforts in order to reach satisfactory results by exploiting the synergies.

Web-based technology platforms and e-operations can quicken the process (Ramanathan [2013]); on the other hand, it's very expensive to set up the infrastructure and develop the knowhow and, at the same time, an adequate level of critical mass is reachable only by mass consumption supply chains.

The CPFR scheme has three major sub-processes, which are planning, forecasting and replenishment, and each of them is formed by a number of steps (Danese [2007]).

Both parts have to formally commit to a program of demand forecast collaboration and develop a joint plan; then, on the basis of collected data, the sales forecast are created, readjusted, combined with inventory strategies and other information in order to generate a specific order forecast and allocate the production capacity.

[46] Economies of scale are factors that cause the average cost of producing something to fall as the volume of its output increases. There are two types of economies of scale: the internal ones, representing cost savings that accrue to a firm regardless of the industry, market or environment in which it operates, and the external ones, depending on how an industry is organized.

[47] Economies of learning derive from the know-how picked up through experience; this phenomenon depends on production levels, but in a different way compared to economies of scale. It doesn't depend on producing more quantity or a wider portfolio, but from becoming a true specialist in a certain field by producing a greater cumulative amount of the same product. There are many ways to drive down costs: by boosting efficiency and reducing waste in production, by R&D synergies and productivity, by better management and speeding up the processes.

The final step establishes the replenishment plan and transforms the order forecast into a committed order; an interesting analysis[48] of the contingent factors of CPFR can help to diversify these solutions (figure 2.20).

A first indicator is the number of interacting units, representing the partners of the focal company, which is high or low (Danese 2007); another dimension is the depth of collaboration, classified in three levels depending on the number of processes and the level of integration: communication, limited collaboration and full collaboration.

The communication simply implies data and information exchanges with trading partners, the limited collaboration synchronizes their plans and manages exceptions and full collaboration includes also coordination of businesses, sales and order forecast plans (Danese [2007]).

The depth of collaboration depends also on which strategy is implemented: the communication level can be achieved with an efficiency strategy, on the other hand limited or full collaboration require a responsiveness strategy.

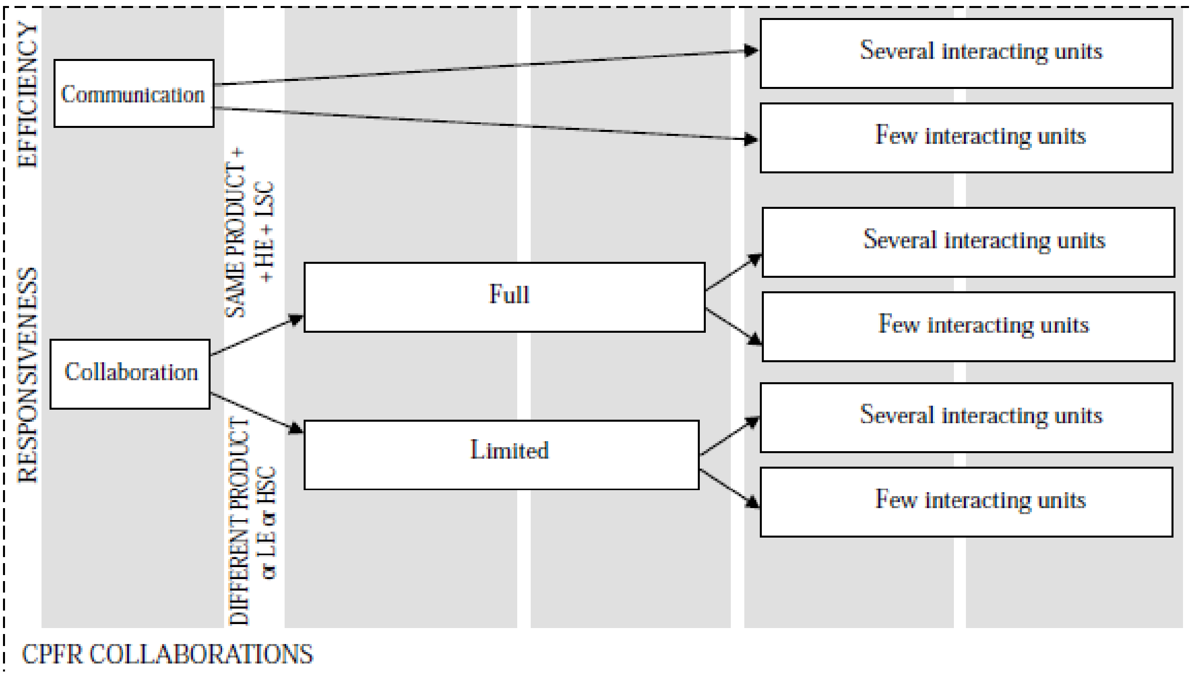

Figure 2.20: a graphic representation of CPFR solutions.

Source: Danese [2007].

[48] The reference is to the paper “Designing CPFR collaborations: insights from seven case studies”, by Pamela Danese [2007].

2.5 SCF Technology

Technology is an important enabling factor for SCF solutions and is critical to accelerate their diffusion in the economic and financial environment; these instruments help to automate processes and payments and to manage documents and information between buyers, suppliers, financial institutions and the others players.

Before analyze this field of application, it's important to understand why technology is able to support the development of SCF.

Firstly, all the processes related to information exchange and material and financial flows are speeded and simplified by technology, with a related reduction in the transaction costs; in addition, these instruments can involve much more actors and facilitate the extension of supply chains.

Finally the technological development makes available new solutions, which provide supply chains members with different choices to shape their business and differentiate from the competitors; in that view technology boosts the emergence of a competitive SCF market and, at the same time, encourages the innovation in working capital financing, as a part of a cyclical and iterative process.

2.5.1 A macro-segmentation of SCF Technology options

An interesting study from Aberdeen Group reports some important information about how SCF technologies can improve a company's position in the market; this survey involved 100 firms from different sectors (the more representative are automotive/aerospace, high technology and retail/distribution), across several areas (USA, EMEA, Asia Pacific) and of all dimensions (27%, 39% and 34% respectively as small, medium and large-sized).

The main results are the following: the firms classified as "best in class" are 6 times more likely to have gained significant competitive advantages, 1,5 times more motivated by emerging profit opportunities of improving SCF technology and more focused on how these enhancements can improve their financial metrics than just seeking internal productivity gains (Best in class gaining competitive advantage with SCF technology, Aberdeen Group, [2007]).

Therefore it's clear that understanding the value and the potential of SCF Technology is now critical for success, especially referring to the ability to choose the most adequate solution; this study provides a macro-segmentation of the different levels of SCF Technology options (Technology Platforms for SCF, Aberdeen Group, [2007]).

The most common instruments to automate financial transactions focus on the several stages of account payable and receivable processes; they include electronic invoice payments, trade finance technology platforms addressed to improve letter of credit, open account and BPO[49] processes, third-party financing and invoice discounting solutions for trading partners.

The figure below (figure 2.21) reports the different layers of SCF Technology available on the market; it's necessary to choose what best simplifies the interactions between buyers, suppliers and financial institutions.

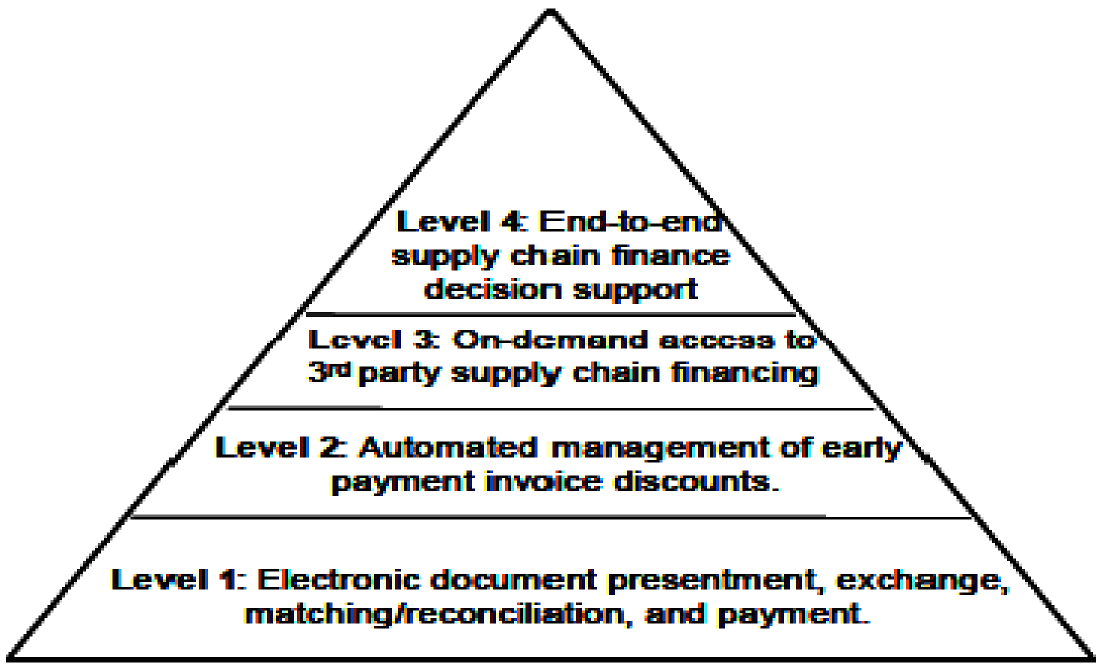

Figure 2.21: SCF Technology pyramid.

Source: Aberdeen Group, [February 2007].

[49] BPO refers to the Bank Payment Obligation, an alternative high technological means of setting in international trade that combines the benefits from letter of credit and open account.

The level 1 concerns the electronic document presentment, exchange, reconciliation and payment; these systems can be a combination of web-based data entry and system-to-system connectivity and they are aimed to reduce transaction processing costs and provide more visibility on the invoicing for buyers and sellers.

The level 2 implies the automation of early payment invoice discounts; the reference is to dynamic discount management, in which are available different discount rates, based on the early payment's days and on pre-determined criteria.

The level 3 includes technology platforms offering different types of financing and funded by bank or non-bank financial institutions.

Finally the step 4 regards SCF supportive tools, like performance scorecards, graphical representations and quantitative metrics; SCF providers offer these instruments to help companies to estimate their own and their partners' current costs and the opportunity costs arising from other missed alternative solutions (Capabilities of SCF Technology solutions, Aberdeen Group, [2007]).

2.5.2 Most common SCF technological schemes

The improvement of IT helps increasing the effectiveness and efficiency of SCF solutions, but is also necessary to support and make possible innovation; there are several technology platforms offering innovative services provided by different actors.

Approved Payable Finance, also known as SCF, is an evolution of reverse factoring and is based the possibility to arbitrage the cost of capital of a buyer across the supply chain and to provide suppliers cheaper financing, cash flow certainty and risk reduction (Working capital technology guide, GBI, [2013]).

Other important groups are Early Payment Financing and Dynamic Discounting; they differ from traditional solutions because the discount rate is calculated as a function of the time of payment and it's possible to open up buyers and sellers to a competitive bid. The success of these solutions depend on the invoicing speed and the possibility to systematize the process of managing discounts; this helps companies to properly understand when it's right to pay or receive cash flows (Working capital technology guide, GBI, [2013]).

Finally there is another technological solution with an enormous potential growing very fast, the Bank Payment Obligation; the BPO offers an innovative mean of setting in international trade combining the benefits of letters of credit and open accounts.
It's an irrevocable undertaking given by a bank ensuring that a payment will be made on a specified date after a specified event has taken place; the BPO provides the same benefits of a letter of credit and eliminate the drawbacks of manual processing associated with traditional trade finance (Bank Payment Obligation, ICC, [2012]).
The BPO and related ISO 20022 messaging standards provide access to relevant data, records and reporting; both ICC[50] and SWIFT[51] believe that by working together and leveraging their respective positions across the trade finance community, they can ensure the BPO will have an important role to play in supporting the development of international trade in the 21st century (http://www.iccwbo.org/About-ICC/Policy-Commissions/Banking/Task-forces/Bank-Payment-Obligation-(BPO)/).
The figure 2.22 reports the differences between BPO, letter of credit and open account:

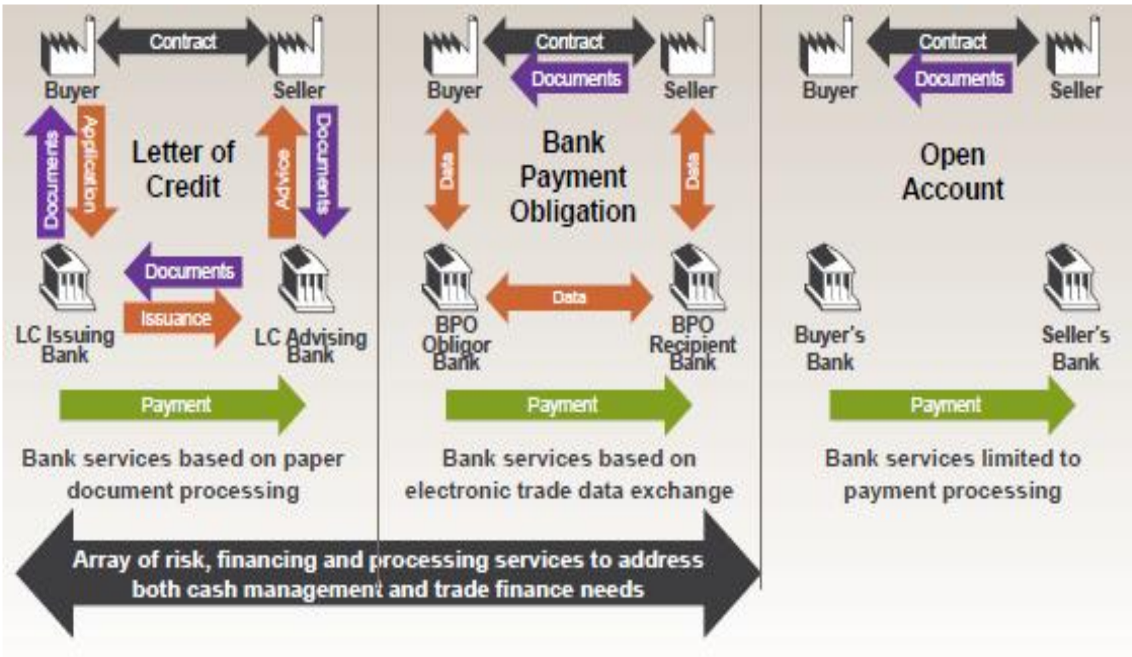

Figure 2.22: BPO vs letter of credit and open account.

Source: ICC, [2012].

[50] ICC is the International Chamber of Commerce and it represents the firms of the entire world with the aim to promote the investments, the market development and the free circulation of capital.
[51] SWIFT is the Society for Worldwide Interbank Financial Telecommunication and it provides a standard for the syntax of financial messages around the world.

There are several players potentially interested; here are reported the main benefits for each category (SCF Payables and receivables solutions guide, GBI, [2012]):

- Importers: safer than prepayment, securing of supply chain, easier financing, cost reduction, more business opportunities, more visibility.

- Exporters: assurance of payment, flexible pre/post shipment finance, automation and visibility, transfer of credit risk, foreign exchange risk reduction.

- Banks: low risk business, lower operating costs, prudent use of capital, automation, targeting of market requirements, strengthening of relationships.

2.5.3 Market of SCF Technology platforms

As said before, SCF technology is provided by different actors; here are reported the main market segments (SCF Payables and Receivables solutions guide, GBI, [2012]):

- Bank SCF offerings: important global banks are developing their own technology in order to get the new business opportunities and to be able to shape more flexibly their offer on customer needs. Currently the most relevant players are J.P.Morgan, Wells Fargo, RBS Group, Bank of America Merrill Lynch, Standard Chartered Bank, Deutsche Bank;

- Non-bank SCF offering: there are other non-bank players providing financial services which are developing their own technology and compete with banks. Two main operators are Prime Revenue and CBC Trade Finance;

- Technology platform sold to banks: not all bank or financial service providers have sufficient resources to develop internally a SCF technology project; some of those don't have the necessary expertise and the skills or don't achieve a sufficient critic mass to make an impressive investment or, as well, don't need to provide customized services of SCF. In this case is possible to apply for the specialized providers of SCF technology, which make available on the market a wide range of solutions. Important operators are Fundtech, Demica, GXS, SWIFT, CGI;

- Technology platform for corporates: finally there are providers of web-based platforms directly addressed to the companies, with a lower degree of complexity and a focus on the automation of payment processes and information exchanges; the main players are Tualia, Oxygen Finance, Kyriba and Ariba.

3 Objectives and methodology

In this chapter are systematically described the steps on which is based the development of the work, including the literature review, the data collection, the processes and approaches of the analysis.

It is also specified on which sources the research process was based in order to obtain complete and reliable information and what markets were taken in consideration for the empirical analysis.

Finally it is explained on which concepts the work focuses for the term SCF, since there are several different definitions of the topic.

3.1 Introduction

SCF is already known in Italy but its solutions are not so common and their level of implementation is still embryonic; for this reason it is very important to realize collaborations between different universities at international level in order to share information and to get contacts and best practices from the most relevant actors.

This work makes reference to this view and was realized in collaboration between the Politecnico di Milano (Italy) and the Fraunhofer Institute IML, Dortmund, (Germany); the Italian part was mainly involved in providing information support and methodological guidelines while the German one was much responsible for the development of the topics and for the empirical analysis.

The information collected came from different international universities and economic subjects and some of the findings of the analysis were shared with several working groups; this is why this work is not only a joint project between two universities, but it falls under the wider European working group known as the Supply Chain Finance Community.

A resuming scheme of the main phases of this work can be useful to have a general idea of how works the research process and the empirical analysis; the methodology followed can be summarized in the following steps:

1. Literature analysis at national and international level to define the different meanings of SCF, its status and its theoretical and practical implications on the current economic and financial environment;

2. Analysis of technical documentation and materials about SCF and its solutions provided by some relevant universities involved in the Supply Chain Finance Community, SCF service providers and private companies;

3. Classification of SCF solutions in order to synthesize the several possibility of investigation;

4. Analysis of the European economic and financial situation, identification of the unexploited potential of SCF and its most relevant future developments, according to the guidelines of the Procurement and Finance department of Fraunhofer IML and the Osservatorio of Politecnico di Milano;

5. Investigation of the future developments of SCF in order to understand why is critical to follow these directions;

6. Analysis of the possible supportive actions of the key players in relation to these trends;

7. Identification of SCF experts from universities, industries and providers to collect information and opinions about these topics;

8. Preparation and execution of interviews with the experts of SCF identified in the previous step;

9. Presentation of the analytical part and preparation of small case studies from Europe to provide good examples of the most innovative solutions of SCF.

3.2 Objectives

The objectives of this work are to study the status of SCF in Europe, identify its unexploited potential and future developments in view of the financial and economic context and to present possible solutions adopted at European level.

The Master Thesis is a joint project between the Politecnico di Milano and the Fraunhofer IML of Dortmund, Germany.

It is considered useful to structure the objectives in the following 3 research questions:

RQ 1. **What is the current state of SCF in Europe?**

The analysis focuses on the most relevant European countries and takes in consideration the benefits, the opportunities and the challenges for the actors potentially involved in these financing schemes; moreover it is reported an overview of the main solutions available on the market and some possible classifications.

RQ 2. **What are the future developments of SCF in a view of the current financial and economic context in Europe?**

Considering the peculiarities of the European markets and the current financial situation, the investigation focuses on the next steps of SCF in relation to its unexploited potential and to the conditions of the weakest subjects of the economic system.

RQ 3. **What are possible solutions in relation to these future developments and the most relevant players in that view?**

For each future development it is interesting to understand which players could have a critical supportive role and why and, in that view, which solutions could be implemented; the analysis reports theoretical implications and some small case studies at European level.

3.3 Data collection

The thesis is based on several sources of information and different steps for the data collection process, starting from a general understanding of the topic and proceeding more and more in depth towards the selected insights.

The starting point was to review manually the main international articles and reports on SCF provided by the Osservatorio Supply chain finance of the Politecnico di Milano, in order to have a brief idea of the theme and the possible purposes of a potential work.

The next step was to have a very quick look of the projects and thesis on SCF previously developed and available on the online repository of the Politecnico di Milano; in this way it was possible to have an overview of the current researches and the different approaches to the topic.

Then, it was found it useful to develop a first theoretical part of the work to clarify the different interpretations and perspectives of SCF, the definitions, the players potentially involved and the relative implications for them, the solutions available and the future state.

Search engines and database have been the main research instruments of this phase; considering the vastness of information available on SCF and all the related arguments, this stage took a really long time and imposed to make a series of filters to neatly collect details and useful indications.

Google was used at the beginning of each research to have a brief idea of the amount of information linked to the selected keywords and to consult websites of companies, public entities, newspapers and universities.

The other prominent engines and database on which the work is based are Google Scholar, Scopus, ISI Web of Knowledge and Web of Science; these sources have been useful to look for specific elements and academic articles.

As regards the filters, the main expedients are report below:

- All data have been analyzed, but it was considered more relevant and important the information collected from recent sources, especially those produced during and after the financial crisis of 2008, since SCF assumes a more critical role in this context;

- The relevance of the sources was defined in relation to their origin, focusing on the academic and business field. Scientific articles, technical reports from companies and governments, official data have been considered more important and reliable, in contrast with documents and booklets with commercial interest and newspapers articles;

- For the first parts of the literature analysis addressed to present the several definitions of SCF and to classify the solutions, no significant distinctions or prioritization were made. Once definitions and classifications were established, the attention was mainly directed to the more narrow interpretation of the word SCF, identified like a technological and web-based evolution of reverse factory and early payments;

- Since one of the main objectives of this thesis was to study the relevant future developments of SCF, the researches focused more on the countries in which this topic is already known and at least partially implemented and supported by the focal players of the economic system; in addition, all data have been taken in consideration, but the priority was to collect information from the Anglo-Saxon and the Northern-European countries, since their financial systems are in general more diversified, complete and innovative.

Afterwards, all the data and the information collected in the previous steps were integrated with the confidential materials provided by academic entities and companies; the first group refers especially to Politecnico di Milano, Fraunhofer IML, Windesheim University and Cranfield University.

Finally additional researches were based on semi-structured interviews with SCF experts in the academic sector, service providers and a focal company; all the relevant findings were integrated with those of the basic previous investigation.

The main purpose of this stage was not to obtain new quantitative information, but instead to get practical implications and qualitative indications based on opinion of experts involved directly in SCF, in order to support and strengthen the perspectives of analysis.

3.3.1 Basic research

As described before, the information collected in this step is mainly based on the literature analysis and on other integrations concerning technical documents provided by universities and companies.

As regards the literature analysis, the references can be divided in papers and articles (40), technical reports from the public sector (11), technical reports from the private sectors (25), books and manuals (4), academic contributions (8), other sources (16).

For the first category, which is considered the most important from the theoretical point of view, are reported the main sources:

- International Journal Production Economics (4);
- International Journal of Production Research (3);
- Journal of business logistics (3);
- International Journal of Operations and Production Management (2);
- International Journal of Logistics Research and Applications (2);
- International Journal of Physical Distribution and Logistics Management (2);
- Production and Operations Management (2);
- Supply Chain Management: An International Journal (2);
- Financial supply chain management (2);
- Economics and Organization (1);
- International Journal of Computer Integrating Manufacturing (1);
- Review of Quantitative Finance and Accounting (1);
- Aspects and Visions of Applied Economics and Informatics (1);
- Computers and Operations Research (1);
- Logistik Management - Innovative Logistikkonzepte (1) ;
- Journal of Banking and Finance (1);
- Enterprise note (1);
- ACRN Journal of Entrepreneurship Perspectives (1);
- Social Science Research Network (1);
- Business Process Management Journal (1);

- Journal of Management Policy and Practice (1);
- Experts Systems with Applications: An international Journal (1);
- European Journal of Operational Research (1);
- International Commerce Review (1);
- Journal of Economics and Business (1);
- Gadja Mada International Journal of Business (1);
- Supply Chain Management Review (1).

The figure (figure 3.1) below reports the several sources organized in six different categories:

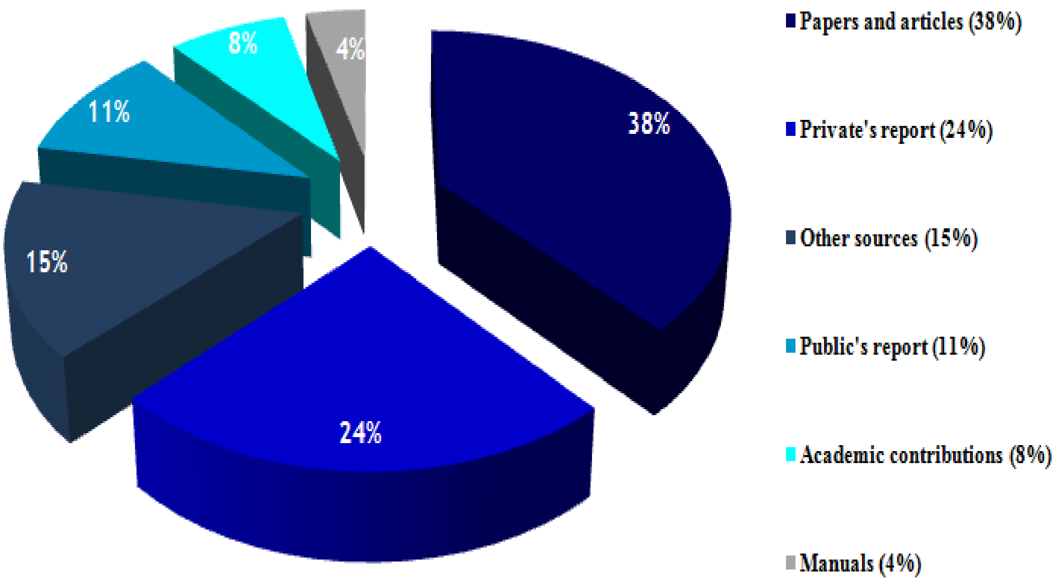

Figure 3.1: The sources of this work organized per categories.

3.3.2 Additional research

This step is based on semi-structured interviews with SCF experts from universities, service providers and a focal company; the information collected were used to integrate the findings of the basic research and to build small case studies on the future developments of this topic.

The main purpose of the additional research was to collect further qualitative information based on the opinion of experts practically involved in SCF schemes and projects; on the other hand is not easy to get quantitative data and to base the findings on reliable numerical indicators, since the solutions on which this work focuses are still in development and not so common.

Moreover the most interesting projects of innovative SCF solutions require relevant investments in cash and time, especially in relation to the preliminary investigations, the project management processes and the engagement of the players; for this reason, the leading subjects, which are usually the focal companies, are not very keen to make available numbers and quantitative indicators, and tend to consider these materials confidential.

The subjects of the interviews were chosen relying on the future developments of SCF identified in the previous chapter and on the geographical pertaining of the investigation; however, considering the specificity of these trends, this screening step was not so complicated and time consuming, since there were only a few available candidates.

As mentioned before, the information were collected with semi-structured interviews, based on a short list of topics and questions, prepared depending on the main argument; the questions were asked in the order most convenient for the conversation and were not formulated every time in the same way.

It was elected this typology of interview because the topics were quite complex and based on the specific subjects; therefore such a flexible instrument allows the interviewees to talk more freely and it can facilitate the collection of more reliable and interesting information.

The list of the interviews is reported below, organized per topics and case studies:

As regards the governmental experiences of SCF the focus was addressed to the UK, since this country is considered as a reference from this point of view; in this regard two interviews were conducted:

- The first was with a board member of the SCF Community and the UK Finance Community Forum, from Cranfield University. It was useful to collect theoretical information about the most interesting projects in the UK and to get new contacts;

- The second was with the Global Network Development Director of a British service provider funded by the government and specified in SMEs financing. The information collected was used to build the case study of URICA.

As regards SCF for the SMEs, three interviews were conducted:

- The first was with the project manager of SCF for the SMEs in the Netherlands. The relative case study is the Promise-to-Pay Engine project, in collaboration between the Dutch Ministry of Economic Affairs and the Windesheim University;

- The second was with the managing director in Germany of an American service provider offering SCF technological solutions, addressed also to the SMEs. The Taulia case study is mainly based on this interview;

- The third was with the CEO of a British early payment platform offering small supplier financing and working with privates and municipalities; the reference is to the Oxygen Finance case study.

Finally two interviews were conducted to collect practical information about Tier 2 SCF solutions:

- Two employees of the Procurement Finance Department of Philips were interviewed; since their focus was to the Tier 2 SCF project of the company, it was possible to present a small case study about that.

4 Future developments of SCF

The purpose of this chapter is to identify and analyze the possible future developments of SCF in view of the current financial and economic environment; in fact it's necessary to continuously improve the effectiveness and efficiency of these solutions and to involve a greater number of players, in particular those who really need alternative financing and working capital management schemes.
In this work three important trends were identified:

- The governmental experiences of SCF;

- The SCF solutions specifically addressed to the SMEs;

- The extension of SCF solutions to Tier-n suppliers.

It's important to understand properly why these trends are becoming increasingly critical and how is possible to act in order to chase them and to catch all the new opportunities; the next step are to find new solutions and strategies that could facilitate the developments of SCF and to identify the most relevant players and what they should do in order to support and encourage these practices.
In order to provide practical implications and examples of success, some significant case studies are presented for each future development of SCF.
The investigation has been carried out at European level and is based on qualitative and quantitative information collected from articles, specialized magazines and journals, technical documentation provided by universities, companies and service providers, semi-structured interviews with SCF experts from academic, industrial and financial sector.
Since this work is focused on innovative instruments of SCF, the analysis takes in consideration only the countries in which this topic is already known and implemented, even though at different levels.

4.1 Governmental experiences of SCF

It can be interesting to make some considerations about the aspects mentioned above and to identify a simple rational scheme of reasoning which represents a linkage between them, highlighting the role of governments as a bridge among the current status and the future trends of SCF.

SCF is a very innovative and complex topic, which stands as an intersection between several areas and requires a wide range of skills; moreover it includes many different solutions and it keeps continuously evolving.

As a result of that, it's common that a significant part of the potentially interested actors are not aware of the real potential of these practices, or don't understand their purpose and strengths. Therefore a first guideline for a government is to promote and sponsor SCF, in order to clarify the main concepts and to engage the most relevant players of the economic and financial system.

In general SCF solutions can imply important investments to reach an acceptable level of efficiency and effectiveness, in terms of cash but especially of time.

As mentioned before, there is a wide range of instruments available on the markets, but the most innovative ones usually imply a high degree of technology; web-based platforms, electronic invoicing tools, vendor rating mechanisms [52] and much more require significant financial resources, whether they are developed internally or outsourced from specialized ICT providers.

Furthermore, sometimes also financial intermediaries are included in these schemes, especially when the number of actors involved is very high and the information and financial flows are complex to be managed; in these cases there are additional costs.

Consequently these alternative financing opportunities are often burdensome for small-medium suppliers struggling with liquidity problems, especially those situated at a Tier 2 or Tier-n in the supply chains; what frequently happens is that SCF is available for those who need less, namely the large focal buying companies (Multi-billion boost for UK supply chain to get business growing, [2012]).

[52] Vendor rating mechanism refer to processes of evaluating and approving potential suppliers by quantitative assessment; the purpose is to ensure a portfolio of best-in-class suppliers is available for use; it's also a process applied to current suppliers in order to measure and monitor their performances.
For simple projects a spreadsheet can be used, but as evaluations become more complex data management and data integrity are significant and web electronic systems are often used.

For these reasons another indication for governments is to actively support the implementation of these practices, in order to develop a market effectively alternative to the traditional bank loans system.

This can be done by planning a public scheme of SCF in which the government takes the role typically played by the focal company of the supply chain; alternatively it's possible to fund SCF service providers and web-based platform operators or to encourage the global corporations in engaging their suppliers, through tax reductions or other incentives. In the figure below (figure 4.1) is reported a summarized scheme.

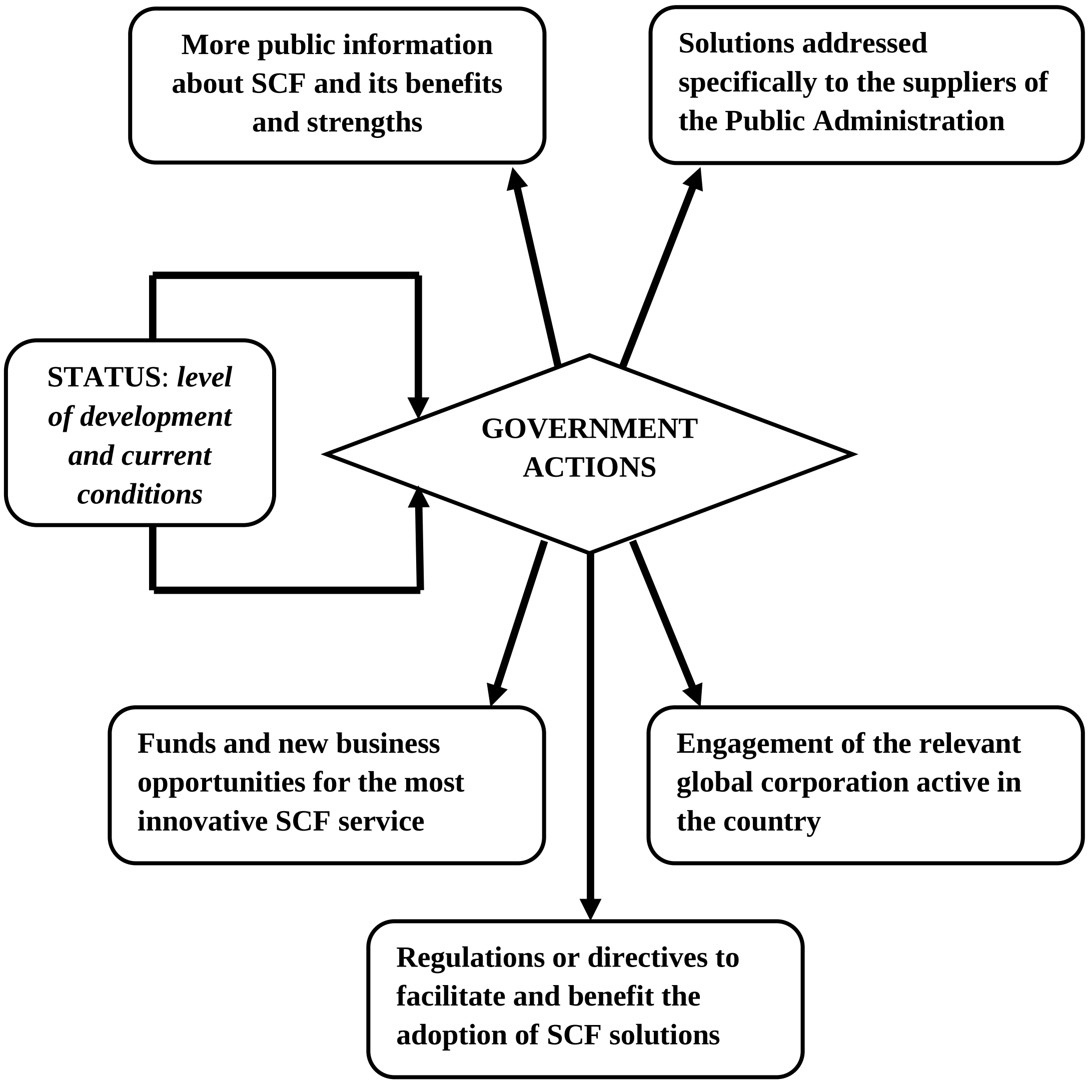

Figure 4.1: role of governments and possible actions.

There are several reasons suggesting a government to support SCF and the following list is aimed to underline the most important ones:

- SCF offers several alternative financing opportunities and consequently favors the investments and the economic growth;

- By supporting the growth and new business opportunities, SCF also benefits the national employment;

- SCF can be specifically addressed to the new emerging business and the SMEs, which frequently represent the most innovative and active actors in the economic system. As a result of that, this is a real support for the innovation of a country;

- SCF strengthens the relationship between the players among the supply chain and, at the same time, reduces the overall risk of the network;

- SCF offers new business opportunities for the financial intermediaries and for the logistic and technology service providers;

- SCF diversifies and enriches the national financial system;

- SCF represents a bridge between the financial flows and the other flows of a supply chain. This is a good step forward the digitalization of the processes and the improvement of the efficiency.

This analysis continues with a review of the governmental activities implemented or under development in the most relevant countries in which SCF is a topic already known.

There were found several different programs of SCF and others more general but interrelated to the first ones; in order to clarify and synthetize the findings, it's reported below the classification of governmental actions used in this work (table 4.1).

Actions	Description
SCF direct actions	1) Development of a governmental scheme of SCF in which the government palys a focal role. 2) Public financing of SCF service providers, web-based platform operators, private global corporations or focal companies. 3) Public financing of SCF technology or infrastructures. 4) Public-private collaboration in SCF researches. 5) Regulations affecting directly SCF. 6) Public reporting on SCF.
SCF indirect actions	1) Governmental sponsoring of SCF and engagement of the most relevant players. 2) Regulations or directives affecting indrectly SCF. 3) Public financing for accademic entities investigating SCF. 4) Financing for the digitalization of the processes.
Other programs	1) Regulations affecting all alternative financing sources. 2) Financing for SMEs. 3) Financing for venture capital and crowdfunding. 4) Programs for the reduction of payment terms.

Table 4.1: a general classification of governmental actions

4.1.1 SCF in Anglo-Saxon countries

The Anglo-Saxon countries, especially UK and USA, are mainly those in which SCF solutions are better developed but nevertheless the governments are making at the same time impressive efforts to support and incentive this field of application.

The main reason relies in the market-oriented financial system featuring the Anglo-Saxon countries, which generates a wider range of alternative solutions to the tradition bank-oriented system of the other developed nations.

United Kingdom: a benchmark for SCF solutions

UK is certainly one the most advanced country from the point of view of SCF and potential influence factors can be easily identified: its financial system is really liquid and good-working and offers several opportunities of alternative financing, since it's mainly market oriented and not monopolized by the traditional bank loan system; the manufacturing industry is an important part of the value added of the country and its related supply chains are expanding and getting more complex; finally UK reacted moderately well to the two recent crisis, but some negative effects are still burdening English companies, in particular the SMEs, which moreover represent an important part of the GDP and the main source of employment.

In particular during the last years of the crisis several economic and financial players started to look for new solutions solving liquidity and working capital problems, reducing the operational and financial risks and strengthening relationships between actors along the supply chains.

Some good results were achieved but there are still lots of things to do and several new business opportunities have not been exploited yet.

Considering all these aspects, the UK government led by David Cameron started in September 2012 an important financing program to increase lending to small and medium-sized businesses from sources other than banks (David Cameron heralds win-win finance scheme for business, The Telegraph, [2012]); by comparing this politic with those of other countries, it's easy to recognized that this example is to be considered a really good starting point for government experiences and can take the role of an instrument of benchmarking.

The UK government actions have been taking three main directions (Making it easier to set up and grow a business, [2014]):

- A strong sponsoring effort was adopted by the government and the prime minister, in order to engage the most important large multinational buying companies, including AB Foods, Jaguar Land Rover, EDF Energy and Rolls Royce. In fact a critical feature for buyer-led SCF solutions is the active role to be played by focal companies in promoting these practices to all their suppliers, in order to make clear the several potential benefits;

- A considerable amount of funds was set up by the Department for Business Innovation and Skills in order to support the best projects of alternative financing. The funds are not addressed just to SCF programs, but also to other alternative financing projects which are of less interest for this work, such as starts-up loan schemes, business angels funds, enterprise capital funds;

- Some regulatory actions were implemented in favor of alternative financing solutions, in particular addressed to SCF programs. Examples of those are regulations on payment terms, tax incentives to invest in small and medium-sized businesses (Seed Enterprise Investment Schemes[53]) and opportunities to deduct financial burdens by adopting SCF solutions.

Making an insight over the second measure, the reference is to the Business Finance Partnership (BFP). The Department for Business Innovation and Skills set up £1.2 billion in order to support financing innovation towards two strands: the first one is addressed to funds management and it's not of interest for this work, the second one is linked to non-traditional lenders that provide alternative sources of financing (Making it easier to set up and grow a business, [2014]).
These include two subjects of interest for this study:

[53] The Seed Enterprise Investment Scheme (SEIS) was launched by the UK government in April 2012 in order to encourage investors to finance starts-up by providing income and capital gains tax reliefs; the behavior of both investors and companies are strongly regulated and monitored to reduce the risk of adverse selection and moral hazard.

- The Market Invoice: it's a London-based online invoice marketplace providing small businesses a wide range of trading possibilities, which are managed by the provider of the service;

- URICA: it's a platform launching a new model of SCF.

Finally another important initiative is the "Funding Circle", a crowd funding approach which has been invested by several local authorities, the Business Finance Partnership and the British Business Bank, that recently announces plans lending £40 million to small businesses (The British Business Bank announces plans to lend a further £40 million to small businesses through Funding Circle, [February 2014]).

Case studies from UK

URICA

General information and kick-off of the project

URICA is an innovative early payment network recently launched by Lindsay Whitelaw; the original idea takes form by considering that in the UK there are no many funding option for SMEs these days. Even in case of high-quality projects, these subjects are probably required to take on more debt and risk all.
Since small businesses are usually run by people who take risks to build something of value and who often employ many people in their local community, financial environment should work at its best to support their growth ambitions.
Urica was born out of deep frustration by the banks' lack of financial innovation for SMEs; it does not imitate other products for small businesses, since provides SMEs with early cash payment of invoices without any debt, security or personal guarantees.
Large corporates started to understand it's important to control, direct and optimize their supply chain and, as a consequence, new collaborative models came out in these years, but it usually starts with most important and strategic suppliers; in general SMEs are not considered like that and continue to suffer from liquidity problems.

This is why the British government took interest in SCF models, as an alternative source of financing for the weaker subjects in the economic system.
In 2009 the Bank of England, together with the most relevant financial institutions of the country, came up with the fact that SCF was not available for the SMEs; in order to support the economic growth and especially the exports, it was necessary to think solutions specifically addressed to small business and aimed to connect buyers and sellers quickly and efficiently.
These objectives fully matched Urica platform; as a consequence, in May 2013 this project received £10 million funding from the government through the Business Finance Partnership and other £10 million from RSA Group.

Business model

Urica offers an alternative to bank-provided SCF programs, providing suppliers with earlier low-cost access to the capital locked up in invoices, with no debt, and with no additional costs for buyers; at the same time the buyers get several benefits, since it's possible to gain supply chain resilience and to extend payment terms.
The platform is thought for companies turning over just £5 million or more wishing to offer SCF to small suppliers further down the supply chain which are not able to take part in existing programs (Strengthening UK Supply Chains, [2014]).
Growth companies with a turnover between £5 and £150 millions are being asked to join the platform; once they logged on, their suppliers are invited to sign up.
Of course a similar solution leads to important and non-trivial risk implications, since the only condition for suppliers to be accepted in the platform is the possibility to get a rating.
The rating assessment of the suppliers was one of the more difficult and longer steps of the project development and it was necessary to establish a partnership with Euler Hermes, a leading player in this specific sector.
The funds are provided by a separate conventional fund involving the British Business Bank, the RSA Group, other insurance companies and pension funds.
Basically this solution allows the selected suppliers to load their invoices on Urica and receive payments as quickly as one day after the related approval from the buyer; there are no commitments or personal guarantees and the only charge is the invoice discount,

which fluctuates close to the 2% of invoice value, depending on the number of days required for the early payment.

Finally Urica receives the full invoice amount from the buyer on the pre-agreed settlement date, typically 90 days.

Urica works good and efficiently also with exports, since its network has access to data on 40 million companies worldwide; British small and medium exports can be paid earlier and cheaper by Urica and offer to their overseas customers up to 90 days open account credit, with zero currency and credit risk.

The figure 4.2 reports the business model of Urica:

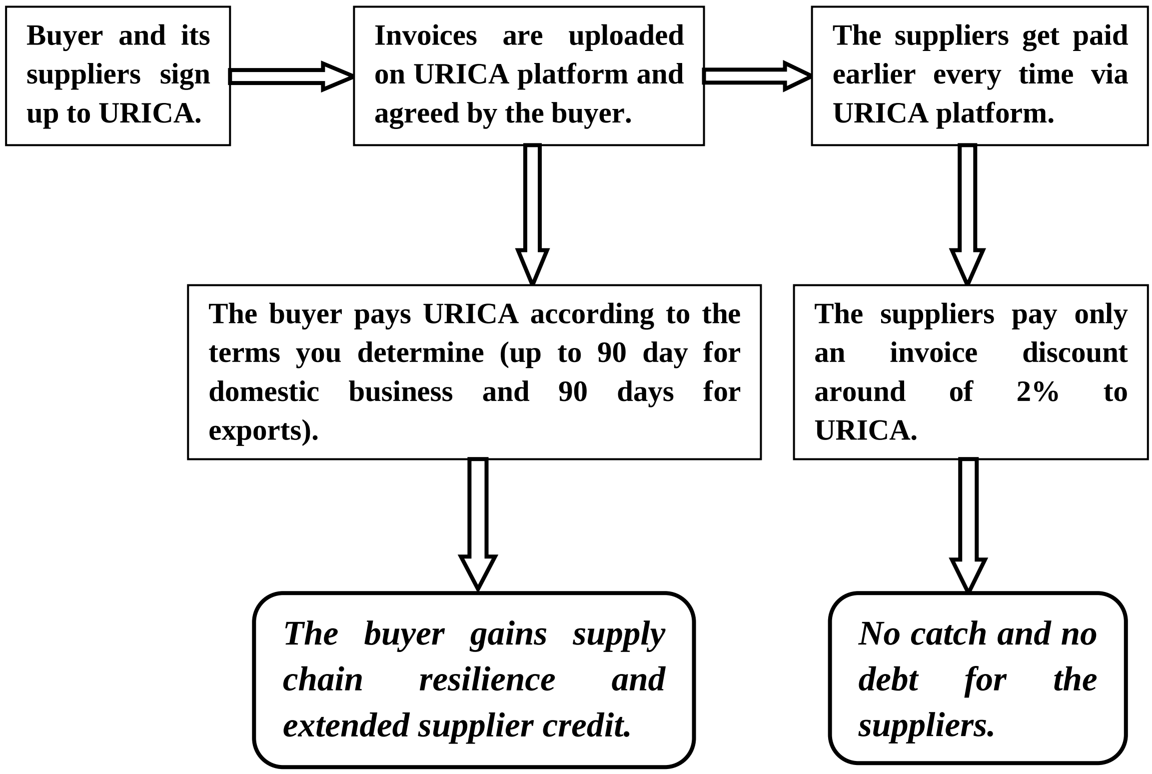

Figure 4.2: the SCF of URICA.

Competitive advantages of Urica

Since there are several SCF providers on the market, it's interesting to understand the main factors differentiating Urica from the competitors:

- The platform is available for a significant number of suppliers, since all the subjects able to get a rating are included. This is an interesting advantage because in several other SCF platforms funders or service operators have the possibility to select the buyer´s supplier base;

- It's a solution specifically addressed to the SMEs and that means to have a really huge potential market to satisfy;

- Corporate and social responsibility is really important for Urica and it can imply an advantage of public image;

- This program is supported and sponsored by the British government and this should facilitate the growth of the platform.

Future developments

Today Urica is mainly focus on the UK market, since the first idea was to support the British economic growth and to support local SMEs selling their products and services in England or abroad; moreover the financing sources of Urica are significant, but still not sufficient to expand the business at international level.

However Urica's managing director Mr. Fitzharris expressed its future intention to develop similar activities in other European markets; in particular Urica is investigating about Italy, Spain, France and Germany, which are markets really looking for solutions specifically addressed to the SMEs, considering their huge influence on the economic system.

Up to now, and especially in Italy, the most relevant obstacle is the law; the regulations are very complicated and difficult to interpret and of course this is not an incentive for the implementation of alternative sources of financing.

NHS: example of a direct government involvement in SCF

The British government also developed its own personal SCF scheme in order to sponsor this program and it decided to offer an innovative financing opportunity to its own suppliers.

The first SCF project undertaken by HM government is a scheme for the community of pharmacies in England, which is unlocking up to £800 million on new credit for around 4500 businesses, many of which are SMEs (Supply chain finance scheme unlocks credit for community pharmacies, [2013]).

The community of pharmacies dispense around £80 million NHS prescription items every month according to the NHSBSA[54] and they usually get an estimated 80% of their payment within four weeks of sending their invoices, with the balance being paid the following month; however in the meantime, suppliers need to be paid and many pharmaceutical businesses use commercial loans to maintain cash flow, but this is quite often very expensive (Multi-billion boost for UK supply chain to get business growing).

In its new SCF solution, the government directly acts as a large reliable buyer by exploiting its high credit rating in favor of its own suppliers, which consequently can obtain more flexible and cheaper financing and are able to improve their working capital position.

This solution implies that a bank makes the NHSBSA's estimated payment available to the pharmacies at around day seven; on the other hand, the pharmacies pay a very low interest rate to get early and flexible access to capital.

This program, known as The Pharmacy Earlier Payment scheme has been living from May 2013, and it's currently involving City Bank as the financial intermediary managing the scheme.

To briefly summarize the main key points it's useful to underline the following details (Pharmacy Earlier Payment Scheme, citybank.com, [2013]):

- City Bank works with UK government and NHSBSA to offer to the community of pharmacies early payments, in as quickly as 7 days rather than the current terms;

[54] NHSBSA is the National Health Service Business Service Authority; it's a special entity of the Department of Health and provides a range of critical services to NHS organizations, contractors, patients and the public.

- The interest rate is based on the credit rating of the public authority and is extremely low, typically around 0,6% per month of invoice value;

- Registration is free and there are no other charges for pharmacies except for the previous interest rate; also leaving the program is completely free.

Case study: Day Lewis Group[55]

Day Lewis Group is the UK's largest independent pharmacy chain owing over 200 pharmacies across the country; this company is changing its own approach by targeting a patient-oriented service provider business and consequently it needs capital in order to extend its activity.

The firm joined the innovative SCF scheme provided by City Bank on behalf of the government; that makes possible to improve its own working capital position at a lower cost and to boost growth.

During the financial crisis, Day Lewis' banking partners imposed a working capital covenant on the business, and when NHS didn't reimburse pharmacies on time the company incurred in very serious liquidity problems; as a consequence its borrowing cost was extremely expensive.

By adopting the new scheme, Day Lewis currently secures cheap invoice finance based on the NHS's credit rating, benefiting with all the resulting advantages of the situation.

The company's CEO Kirit Patel confirms that the balance sheet is now transformed; in fact, according to several key performance indicators, the firm is getting savings for £200,000 in interest cost and is able to reduce its overdraft.

[55] The reference is to the City Bank case study document, published on treasurytoday.com, July/August 2013.

The situation in the USA

The USA is probably the country where financial markets are more developed and where the opportunities to get capital are larger, but also where the financial crisis left the worst mark, forcing several companies to shut down or downsize.

The firms which overcame this difficult situation have to deal with serious liquidity problems, especially those of small and medium size, responsible for the majority of US job creation and for close to half of gross domestic product.

While several companies made momentous strides in recovering from the damages of the crisis, too many small businesses continue struggling to access capital, with a resulting drag on growth and employment (SupplierPay Pledge, The White House, [2014]).

President Obama brought together 26 companies, both small and large, that committed to the initiative; for the first ones, benefiting from this program means to have more capital for new opportunities and new hiring, whilst for the second ones it's a demonstration that healthy supply chains are good for business.

The three guide lines of the program are the following:

- A new working capital solution will be adopted to help small business suppliers reducing their capital needs and funding working capital at a lower cost. The idea is to pay them faster and to make available an alternative financing solution;

- Best practices will be shared in order to encourage the interested players and tangible outcomes will be publicized, providing visibility and focusing on the key points of the program;

- The government is committed to realize a win-win situation, supporting and benefiting the companies and, at the same time, minimizing the administrative costs, in order not to burden on taxpayers.

This program takes inspiration from another initiative of the US government knows as QuickPay, launched by President Obama in 2011; it has been requiring federal agencies to expedite payments to small business contractors within 15 days, and as a result of that over $1 billion was realized in cost savings for companies; moreover the program is now renewing, because QuickPay requires government to pay large contractors faster and, in return, requires them to pay their small subcontractors faster.

SupplierPay is the private sector's equivalent of Quickpay; large companies commit to pay small suppliers faster or to help them getting capital at a lower cost, under the supervision of US government (President Obama announces new partnership with the private sector to strengthen America's small businesses, The White House, [2014]).

Furthermore, it makes sense to consider another interesting program that the government is sponsoring, namely the Supply Chain Finance Guarantee Program (Export-Import Bank of the United States, February 2012).

It's a possibility offered to lenders which benefits US exporters and their suppliers through accounts receivable financing.

Suppliers can sell their accounts receivable to a lender to obtain early payment of invoices at a discount rate and, at the same time, exporters have the option to extend payment terms and achieve a working capital benefit without imposing them an undue financial hardship.

The Ex-Im Bank[56], which bears the full faith and credit of the United States, provides a 90% guarantee of an eligible invoice, while the lender faces just 10% risk and moreover maintains a direct relationship with the exporter and the suppliers without the Ex-Im Bank involvement; the figure below (figure 4.3) briefly reports the mechanism of this program:

[56] The Ex-Im Bank is the official export credit agency of the US federal government and has the purposes of financing and insuring foreign purchases of US goods for customers unable to accept the risks, and to sustain US jobs by financing sales of US exports to international buyers.

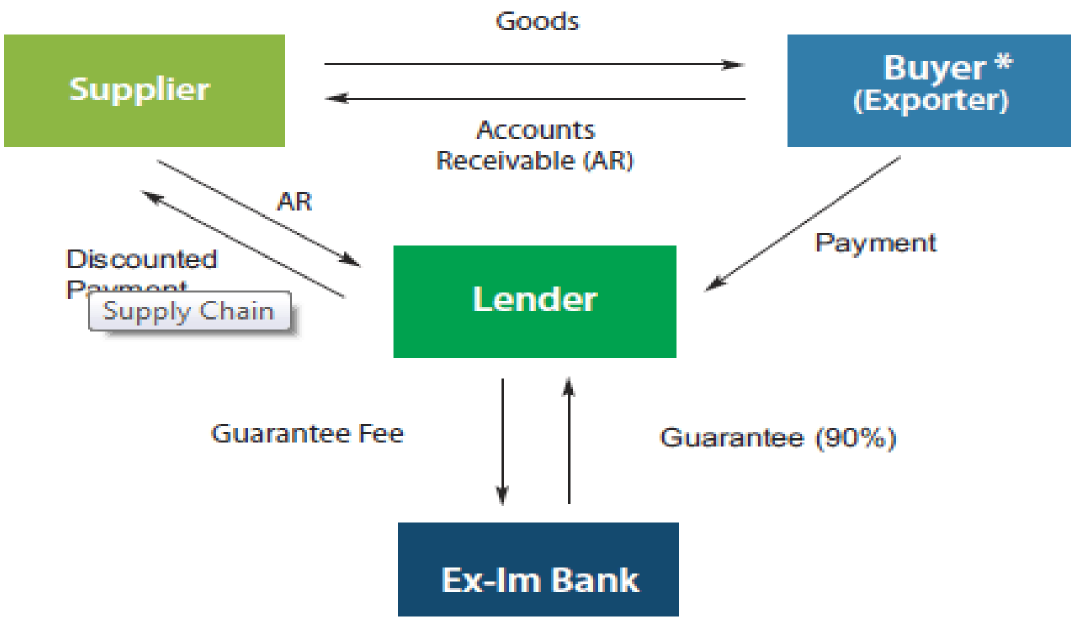

Figure 4.3: the mechanism of SCF guarantee program.

Source: Export-Import Bank of the United States, February 2012.

There are some criteria to be met before implementing this practice: the exporters have to be domiciled in the US and the exported products must meet Ex-Im Bank's SCF policy requirements, the suppliers must be domiciled in the US and a minimum of 50% of invoices' value must be from companies respecting the small business definition[57], the lenders must have an existing SCF platform which is subject to Ex-Im Bank due diligence and approval.

Finally it's important to underline that this program was initially designed for US exporters, but could also apply to a foreign buyer and their US based suppliers.

Just to provide some examples, companies like Boeing, Caterpillar and Case New Holland are currently participating as exporters, while CitiBank is involved as lender; in 2011 the Ex-Im Bank approved the Boeing supplier program with an initial capacity of $740 million, and this measure should be considered truly impressive, especially in light of the typical credit crunch practices of that period.

[57] To help small business owners assess their small business status, SBA (Small Business Administration) has established a table of Small Business Size Standard, which is matched to the North America Industry Classification System (NAICS) for industries (http://www.sba.gov/sites/default/files/Size_Standards_Table.pdf).

The situation in Canada

The implementation of SCF solutions is still nascent in Canada, where large companies acting like GVC[58] anchors have already started to look in that direction, but at a slower pace (Lamoureux and Evans, [2011]); maybe the most relevant reason is that in this country factoring and other similar practices are commonly considered as a financing tool reserved for companies with weak financials. Therefore this negative stigma could have a moderating effect of the degree of interest of Canadian firms towards these innovative solutions, which take just the first inspiration from factoring but include several additional innovative aspects.

Another reason could be the absence of a specific legislation on electronic bill of exchange[59], which is a concern for Canadian banks; as a consequence B2B invoicing is slowly and costly in all North America due to the lack of automation.

Finally the limited presence of investment-grade GVC anchors in Canada tends to make this country unattractive for technology service providers and global banks, among which just CitiBank and HSBC are currently promoting their SCF services (Lamoureux and Evans, [2011]).

This aspect also highlights another hedge affecting SCF: most of solutions are feasible just in the presence of big focal companies and that could be a problem; therefore is evident the need to develop instruments and schemes addressed specifically to the SMEs.

So the current situation in Canada underlines the presence of a credit market gap, which must be filled by SCF; it's possible making reference to the definition of Riding and Belanger [2007], who defines the market credit gap as a situation in which among identical loan applicants, some receive credit while others do not, or some identifiable groups in the population are unable to obtain financing at any price.

For this reason it's becoming critical the role of the public policy and the Canadian government is moving across the main following directions (Supply Chain Finance: a new means to support the competitiveness and resilience of global value chains, Role of Public Policy, Lamoureux end Evans, [2011]):

[58] GVC refers to Global Value Chain.

[59] A bill of exchange is a commonly used financial instrument in international trade transactions; it's an unconditional order from the exporter to the importer, requiring the importer to make payment on demand on the due date.

- Significant efforts of engagement and sponsoring have been implementing to involve large reliable companies in these alternative financing programs and to make clear all potential benefits for buyers and suppliers achievable through SCF;

- Public sector also started to invest in SCF technology and related infrastructure through cost-sharing with banks and industry associations. For instance the government could play a role in catalyzing the formation of platforms, through direct investment and technical support, or indirectly by regulatory changes and tax credits.

- Canadian trade and investment policy are also considered strategies to improve Canadian company access to global SCF platforms, including bilateral and multilateral negotiations in order to quicken the penetration of national firms into the growing emerging markets.

4.1.2 SCF in Continental Europe

The continental European countries are traditionally featured by a different setting of financial markets, in comparison with the Anglo-Saxons; this system is mainly bank-oriented and it’s a bit more reluctant to introduce innovations related to alternative financing schemes.

Nevertheless SCF solutions are gradually developing, in order to solve the serious working capital problems which, with a different burden depending on the country, are still affecting many firms, in particular the small and medium-sized.

However, in most cases, these schemes involve just larger and reliable companies, namely those who need less financial support; the most critical problem regards the SMEs, which moreover have a significant importance on the performances of the main aggregate indicators.

The European governments are progressively moving to this direction and the idea is to take inspiration from the action of the British government[60]; up to now, several programs have been implemented, but just few ones are specifically addressed to SCF.
Now is reported a general overview of what is happening in the main Euro-zone countries; the aim is to understand how the governments are moving in supporting SCF and specifically the SMEs and to identify the potential areas of improvement.

The situation in the Netherlands

Probably the Netherlands is the most advanced continental country for SCF (Supply chain finance reaches the Netherlands: the next financing initiative unveiled, PrimeRevenue[61], [2014]); the Dutch Ministry of Economic Affairs recognized it as a powerful solution to boost its economy by injecting liquidity into the market place.
The government is investigating SCF to support local companies across various industries and to increase the cooperation between the public sector, funders and corporations; examples of this effort are the alternative financing solutions developed by Philips, Heineken and KPN.
Another interesting indirect initiative of the Dutch government is the adoption of the new EU Payments Directive.
That enables firms to get paid within 60 days and 30 days, respectively for trade in the private and public sector; that's good for suppliers, but it's also an incentive for buyers to adopt SCF solutions, in order to mitigate the disadvantages provided by the new regulation.
In addition the government launched a fund of €5 billion (2014-2018) to build a total financing solution for the SMEs that aren't able to join regular SCF programs, knows as Promise-to-pay Engine; this initiative is presented further on as a case study.
Finally the Dutch government is also supporting other general programs for the SMEs, by standing as a point of reference for the other countries of Continental Europe; some committed public funds (2014-2019) are addressed to the creation of a cash reserve for SMEs, venture capital funds supporting innovation and starts-up, accompanying

[60] The reference is to the new financing program launched by David Cameron.
[61] PrimeRevenue provides an online platform to process supply chain finance transactions and it offers OpenSCi, which includes a portfolio of working capital and cash flow optimization solutions for buyers, suppliers, banks and funders.

measures improving skills, organizational tools and credit of SMEs (Dutch Institute for Advanced Logistics, [October 2014]).

The situation in Italy

Italy is probably the country in which the small and medium-sized firms affect more the economic system, in particular in terms of GDP and employment; the Italian SME represent the 99,98% of the total and the 92% of the exporters, employ the 82% of industrial workers, produce the 58% of Italian industry revenues (Banca d'Italia).

This segment of firms is still suffering from the two recent crises; in particular the credit crunch led to serious liquidity problems, emphasized by the high level of short-term bank liabilities featuring the Italian corporate balance sheets.

The last Italian governments were not very effective in implementing supporting actions to mitigate these effects, also because the Italian politic situation has been quite unstable over the recent years.

However some actions in support of the SMEs were developed in collaboration between public authorities and private sector, but mainly concerning long-term financing opportunities; since bank loans are decreasing and considering that the Italian financial market for SMEs is not very liquid, a new financial and economic plan was developed; "Mini-Bond" is addressed to small firms and offers alternative capital sources and a more diversified financial exposure, through the issue of securities available for several categories of investors.

Basically it's possible for SMEs to emit bonds of different amounts, also very reduced, addressed to several different categories of investors, without incurring in the very high emission costs of a traditional placement; of course there is a quite strict regulation that forces these companies to ensure an effective informative disclosure and to respect specific financial and audit requirements (Mini Bond, Camera di Commercio Milano, [2013]).

Unfortunately, up to now, there are no structured programs for the short-term financing, which represent a criticality for Italy, since the percentage of trade credit on the Italian company balance sheets is really impressive if compared with those of the other European manufacturing countries.

The figure 4.4 reports below the trade credit in selected euro-area countries as a percentage of the balance sheet total:

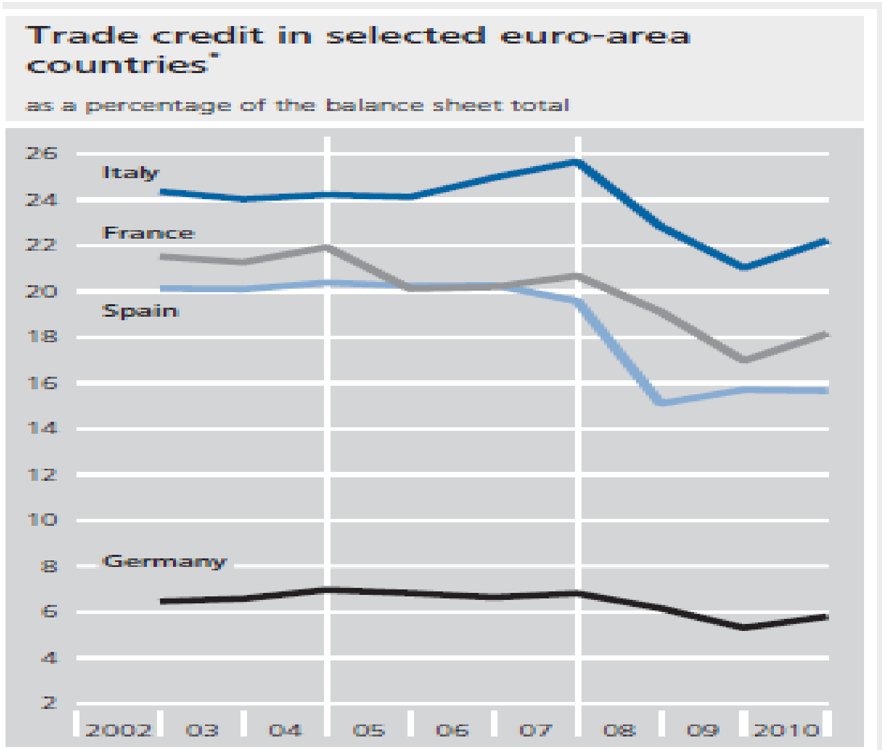

Figure 4.4: the trade credit as a percentage of the balance sheet total.

Source: Deutsche Bundesbank Report, [October 2012].

Another important aspect to be underlined is that Italy is the first country in Europe for the factoring business volume, which represents the 8% of global market and the 13% of the European one, and registered an amount of €53 billion in the period January-April 2014, the 11% of base year GDP (Assifact[62], [2014]).

Therefore it's clear that SCF innovative solutions could strongly affect the Italian economic and financial system, and as a result of that government actions are absolutely necessary to quick the propagation process and to increase the awareness of what is the potential of these instruments.

[62] Assifact is the Italian Association for Factoring.

These considerations take even more value considering the Italian payment terms; on average the privates pay after 75 days, the companies after 94 days and Public Administration after 165 days, compared to a European average of 47 days (European Payment Index, [2014]).
This is why the Italian government led by Renzi started to investigate alternative financing solutions to enhance the working capital position of firms.
Some resources were devoted to associations and academic entities studying SCF and other more direct actions were addressed to Regional local projects; an example of that is the financing of €500 million known as “Credito Adesso”, activated from Regione Lombardia and Finlombarda[63], to develop innovative solutions supporting the working capital of the Lombard SMEs (Nuove misure di supporto al capitale circolante, Regione Lombardia, [2012]).

The situation in Germany

Germany is the country that overcame best the negative effects of the crisis and it relies with a solid financial system and healthy companies, competitive on the international markets; the German smaller firms present on average good financial conditions compared to those of several other European nations, relying with a sufficient availability of credit at quite low interest rates.
According to a survey of the Federal Ministry of Economic Affairs, only 18,2% of companies report that banks are pursuing a restrictive credit policy (The German Mittelstand: driving the economy facts and figure about German SMEs, Federal Ministry of Economic Affairs and Energy, [2014]); the main problem for German firms seems to be the bad situation of many enterprises of the other European countries, especially the SMEs.
Affected by a decreasing demand from Euro-zone countries, which account for around 40% of German exports, and from a resulting drop in manufacturing orders in 2012 and 2013, German companies delayed their investment plans; in other words, to exploit all the future opportunities it’s critical to work together with the strategic partners, which are frequently local suppliers from CEE suffering from financing and liquidity problems

[63] Finlombarda is a public financial society completely own by Regione Lombardia, with the role of implementing the regional programs of economic, social and territorial development.

(Building sustainable strength in German and Central European supply chains, Demica Report[64], [2013]).
Within this context SCF is seen as an efficient tool in relieving cash flows pressures: by offering new opportunities of financing to small local CEE suppliers, also the German supply chains can achieve several benefits.
Moreover, the recent EU Payments Directive was implemented also in Germany; considering that, large buyers have to deal with higher debt and lower liquidity, and this is why SCF could come into play, offering cheaper early payments for suppliers and, at the same time, extended payment conditions to the buyers.
That is great also in view of the relevance of trade credit in Germany, that according to the Bundesbank's financial statement statistics is the second most important external financing instrument used by non-financial companies, and is the most important source of short-term external financing (Deutsche Bundesbank Report, 2012]).
The German government has supported these innovative schemes by sponsoring the EU Payments Directive but specific SCF programs have not implemented yet.
On the other hand, during the financial crisis the government implemented some more general financing programs to support the SMEs and their access to credit: the most relevant is known as Business Fund Germany, which was established in March 2009 (expired as scheduled at the end of 2010) with a total size of €115 billion and represented an opportunity for SME to benefit of a government-appointed credit mediation enforcing their creditworthiness (The financial system, Deutsche Bundesbank Report, [2010]).

There were also implemented by the government other SMEs supporting programs (Building on SMEs, Federal Ministry of Economics and Technology, [2013]):

- The Kreditanstalt für Wiederaufbau (KFW) and the ERP Special Fund, implemented in 2010, provide financing for 72500 companies with a year amount of €16,4 billion in order to support new starts-up, innovation, environment and regional development.

[64] Demica is a market leading provider of specialized working capital solutions, providing consulting, advisory and technology services; it works with leading banks, private equity sponsor and global corporations to implement innovative solutions to their supply chain finance requirements.

- In 2011 the government increased from €500 million to €1 billion its share in ERP/EIF Fund of Funds, which participates in venture capital funds oriented to German technology firms in the early and growth phase.

4.1.3 European Union SCF initiatives

In order to strengthen the potential benefits of SCF solutions and to accelerate their diffusion, it's very important for a community market to be supported and coordinated by a supranational organism with univocal guide lines; therefore is reported a brief summary of the European Union SCF initiatives. Up to now, the most relevant action is the European Directive 2011/7/EU on combating late payment in commercial transactions (A User Guide to the recast Late Payment Directive, Department for Business Innovation and Skills, [October 2014]).

Basically debtors will be forced to pay interests and reimburse the reasonable recovery costs of the creditors, if they don't pay for goods and services on time; 60 days for business and 30 days for public authorities.

This regulation came into force on 16 March 2013, but the statutory right to claim interest and other compensation recovery costs is not compulsory and it's up to the supplier to decide whether or not to use it.

The legislation is aimed to create an environment where paying on time is the norm, in order to facilitate the SMEs and to incentive the big companies to adopt SCF solution; EU Commission estimated that, ones introduced by all EU members, this new rule could mean an extra £150 billion available to businesses.

It's reported below how interests and compensations are calculated, in case of late payment:

$$\text{Interest} = \text{Debt} \times (\text{national bank's reference rate} + 8\%) \times \frac{\text{number of days late}}{365}$$

Compensation for recovery costs: £40 / 70 / 100 fix amount on £999,99 / 9999,99 /over 10000 unpaid debt (example from UK).

Another EU action is addressed to review European Directive 2011/7/EU in order to reduce the legal issues for buyers that increase their DPO through SCF solutions and consequently to reduce their legal costs.

In addition SCF could be facilitated by electronic invoicing but SMEs really need a digitalization of the internal processes because they still resort with manual invoicing; for this reason EU commission is working to encourage e-invoicing in public procurement by providing subsidies and incentives and by monitoring and measuring the adoption of e-invoicing in Europe (European Multi-Stakeholder Forum for e-Invoicing).
The last aspect concerns the risk related to the growing volumes channeled through SCF solutions; the EU Commission is developing suggestions and directives for regulators in order to engage the wider supply chain risks on national and EU level.

The summarized results of this investigation are reported below (tables 4.2, 4.3, 4.4):

Country Area	Country	SCF direct actions	SCF inderect actions	Other programs
Anglo-Saxon Countries	**UK**	1) Implementation of **Business Finance Partnership program**, by financing supply chain finance and other alternative solutions (**URICA platform, Extra Bank Market Invoice, Funding Circle**). 2) Development of a governmental supply chain finance scheme for the **NHS pharmacy system**. 3) **Crossrail use of Project Bank Account** to pay Tier 2, Tier 3 directly, avoiding Tier 1 delays in passing on funds. 4) **National Rail** actual payment performance reducing from **55 to 33 days**. 5) **Public reporting** of all national and local agency payments against 10 days target for SMEs.	1) Strong **governmental sponsoring** effort to engage the largest buyer companies and to encourage them to ivolve their own suppliers. 2) **Prompt Payment Code** sponsored by UK government (driving ahange in payment culture). 3) Department of Business Innovation and Skill run the **Financial Expert programme** though the **MAS [a]** for SMEs which includes sessions on SCF.	1) Regulatory actions in favor of alternative financing: deductibility of financial buredens and tax incentives for small innovative businesses (**SEIS [b] program**). 2) New financing announced by the **British Business Bank** to support the Funding Circle, a crowdfunding approach for small businesses.
	USA	**SupplierPay Program** involves large companies to help suppliers getting access to lower cost capital by implementation of SCF solutions, under the governmental monitoring.	1) Strong **governmental sponsoring** effort to engage the largest buyer companies and to encourage them to ivolve their own suppliers. 2) **Government commitment in sharing the best practices** and underlining the tangible outomes of the successfully solutions, by providing visibility and publicizing key points of implementation.	**QuickPay Program** requires federal agencies to pay their contractor faster (within 15 days) and in return requires them to pay their small subcontractors faster.
	Canada	Public partecipation in **financing SCF technology and infrastructures.**	1) **Governmental sponsoring** of SCF to engage the main local companies 2) Establishment of a **new trade and investment policy** to facilitate access to global SCF platforms, by the implementation of international multilateral negotiations.	

Table 4.2: resume of governmental experiences in the Anglo-Saxon countries.

Country Area	Country	SCF direct actions	SCF inderect actions	Other programs
Continental European Countries	Netherlands	1) **Public-private** collaboration in the area of research in SCF (Windesheim University). The running projects are: **SCF 2.0 [c], SCF for SMEs, SCF International Sustainable Development** (SCF to link developing countries to international markets) 2) **Promise-to-pay Engine**, a new SCF program for SMEs, involving the government, relevant firms, banks and a specialized SCF reserach group (Windesheim University). 3) **TKI [d]** , a private-public collaboration in the area of research in logistics and SCF. The SCF running projects are **Supplier Finance** (providing reverse factoring to the SMEs - Pro-Quidity provider) and **SME solutions** (possibility to get flexible payments immediately by live monitoring´the status of the invoices - Flinquer provider)	1) Implementation of the **EU Payments Directive** in order to facilite small suppliers and to incentive a quicker SCF development. 2) Partecipation/Sponsoring of the government in SCF schemes implemented by some focal companies (Philips, Heineken, KPN).	1) Governemental **cash reserve for SMEs**. 2) **Dutch Venture Initiative**, a venture capital fund financing innovation **for SMEs and starts-up**. 3) Public funds to provide **accompanying measures** in order to improve skills, oranization tools and credit of SMEs (**Standard Business Reporting**). 4) The project **Transinvoice** from **TKI [d]** is aimed to the integration of the operational and administrative processes in a customer platofrom, acting like a bridge between the carrier and the shipper in the logistic sector.
	France	**RCSM [e] project**, a SCF collaboration between buyers and **multi-tier suppliers** funded by the **Pole de Competitivite Finance Innovation**.		**RCSM [e] project** is also addressed to support **SMEs** from an operational point of view, providing more **visibility, agility and flexibility** along the chains.
	Italy	Public incentives to local **regional projects** of alternative financing (**CREDITO ADESSO**).	Public **financing to associations or accademic entities** investigating SCF.	Implementation of the new financial and economic plan **Mini-Bond**, to provide SMEs with new long-term financing instruments and a more diversified financial exposure.
	Germany		1) Implementation of the **EU Payments Directive** in order to facilite small suppliers and to quick SCF development. 2) Government financing to the **digitalization of the processes** and to the **intelligente management of the information flows**, in order to provide a standardization of the transaction and to facilitate the adoption of new potential alternative solutions.	1) **Business Fund Germany program**, providing SMEs with a government-appointed credit mediation. 2) **KFW [f]** and **ERP [g] Special Fund Programs**, supporting start-ups, innovation, environment and regional development. 3) **ERP/EIF [h] Fund of Funds**, which addresses public partecipation in venture capital financing.

Table 4.3: resume of governmental experiences in the Continental European countries.

Country Area	Country	SCF direct actions	SCF inderect actions	Other programs
European Union		Development of suggestions and directives for regulators in order to **engage the risks** arising from SCF solutions **on national and EU level**.	1) **Emanation of the EU Payments Directive** in order to facilite small suppliers and to quick SCF development (from March 2013 debtors are forced to pay interests and reimburse recovery costs if they don't pay on time (60 days for business and 30 days for public authorities). 2) **Review of the EU Payment Directive** in order to reduce the legal issues for buyers who are implmenting SCF solutions.	**Supporting of SMEs** in the adoption of e-**Invoiceing processes in public procurement**, by providing subsidies and incentives and by **monitoring and measuring** the situation across the European countries (**European Multi-Stake holder Forum for e-Invoicing**).

LEGEND

[a] Manufactoring Advisory Service

[b] Seed Enterprise Investement Scheme

[c] Supply Chain Finance 2.0 investigates the future developments of SCF: from post to pre-shipment, models reaching beyond Tier 1 suppliers, collaboration with major players like Heineken, Philips, Unilever

[d] Innovation Top Consortium

[e] Risk, Credit Chain & Supply Chain Management program, supported by the Pole de Competitivite.

[f] Kreditanstalt fur Wiederaufbau.

[g] European Recovery Program, investing in venture capital funds focusing on high tech, early development stage companies.

[h] European Investment Fund, supporting entrepreneurship and innovation in Europe.

Table 4.4: resume of governmental experiences in the European Union.

4.2 SCF for the SMEs

As illustrated in the previous paragraphs, sometimes the adoption of SCF solutions can be difficult for SMEs, which moreover are definitely the players worst affected by the crisis and those who need more financial support; furthermore considering their critical role in term of employment and GDP, it's not surprising that governments, international entities and also private companies and institutions are moving in this direction. Up to now there were developed several general actions in favor of SMEs across different countries, but there is still much more to do since no specific SCF programs for SMEs are already in place.

Of course SCF is not sufficient to solve all the problems of these firms, which have to deal with several different hurdles in an increasingly complex and competitive economic system (Financing SMEs supply chains, The Swift Institute, [March 2013]); here is reported an interesting framework to evaluate the main key factors affecting SMEs and on which would be important to concentrate all the efforts (figure 4.5).

Figure 4.5: a framework of the factors affecting the SMEs.

Source: The Swift Institute, [March 2013].

The SCF focus could be useful to start supporting SMEs from the financial and technological point of view and at the same time could offer several new business opportunities to be more competitive on the market and to differentiate their strategies from the other actors.

4.2.1 Insights into the financial needs of SMEs

The aim of this paragraph is to illustrate some typical financial features and needs of SMEs which it's interesting to analyze in relation to SCF (Insights, The Swift Institute, [March 2013]):

- Working capital constraints: SMEs are under pressure due to the constraints of day-to-day working capital. New possibilities to receive early payments and other alternative instruments could facilitate small firms to operate more confidently and, as a consequence, their demand could be more predictable;

- Fixed capital constraints: firms in a similar situation can unlikely deal with significant investments for improving their process efficiency and for implementing new systems of electronic information exchanges. These two factors are critical to get involved in a SCF practice;

- Inability to get assessed for loans: the lack of documentation providing information on business cash flows, especially for new starts-up, and low credit ratings, make hard for SMEs to apply for loans with the traditional financial institutions;

- Lack of motivation, interest and education: it's very common that SMEs have not sufficient financial expertise and skills to understand properly and evaluate the different financing opportunities available on the market. Coupled with a lack of motivation and interest towards this discipline, this aspect sometimes can lead to bad decisions which could endanger the business success and the financial healthiness of the companies.

4.2.2 SMEs in the economic system and importance of SCF

The SMEs play a pivotal role for employment, job creation, investments, innovation and economic growth and there are crucial for the recovery of the European economy.

A recent study of Deutsche Bank (SME financing in the Euro area, Deutsche Bank, [October 2014]) reports some interesting statistics which can give an idea of the relative importance of this segment of firms for the European economic system and of their difficult situation over the recent years, in the view of the last financial trends.

It's sufficient to take a quick look of the following graphics (figures 4.6, 4.7) to understand why is critical to monitor and support SMEs over time and to introduce innovations that could make available alternative sources of financing and new business opportunities.

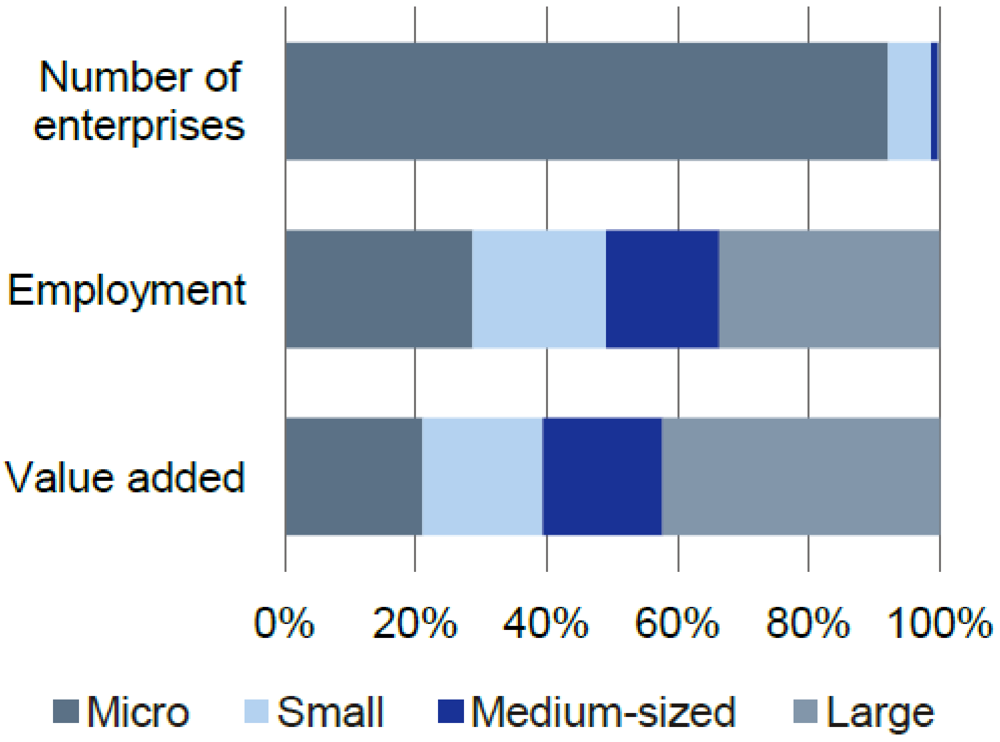

Figure 4.6: SMEs share as percentage in 2012 for EU 27.

Source: Deutsche bank, [October 2014].

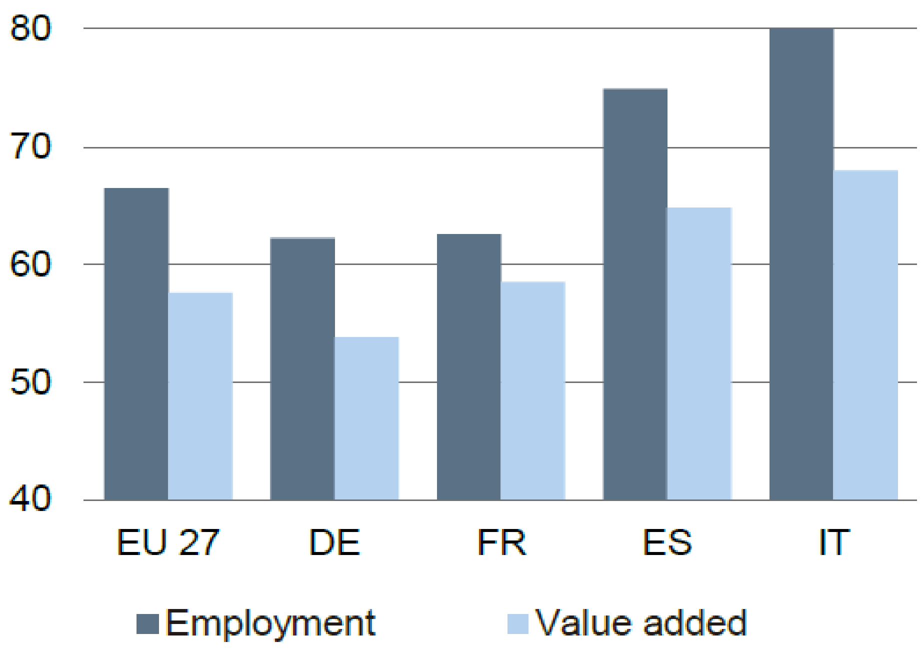

Figure 4.7: SMEs contribution to employment and value addes.

Source: Deutsche bank, [October 2014].

Despite the major contribution to the real economy the possibilities of funding alternatives available to SMEs is constrained compared with large corporations.

The main reason is that they usually are not very transparent, since their organizational features and business strategies are rarely publicly disclosed; this information opacity limits their access to standardized public markets for equity and debt.

As a consequence SMEs often rely on bank loans, but the very favorable market conditions changed drastically with the intensification of the financial crisis of 2008 and since then several firms on aggregate suffered to some extent from disruptions in supply of bank credit (figure 4.8); it's true that there is a cross – country divergence in access to finance in Europe, but however the recent trend showed a generalized tightening of the financial conditions everywhere (figure 4.9).

Also the lending rates increased disproportionally for SMEs after the crisis, especially considering the southern Euro area countries, but also in this case the situation deteriorated for everybody (figures 4.10, 4.11).

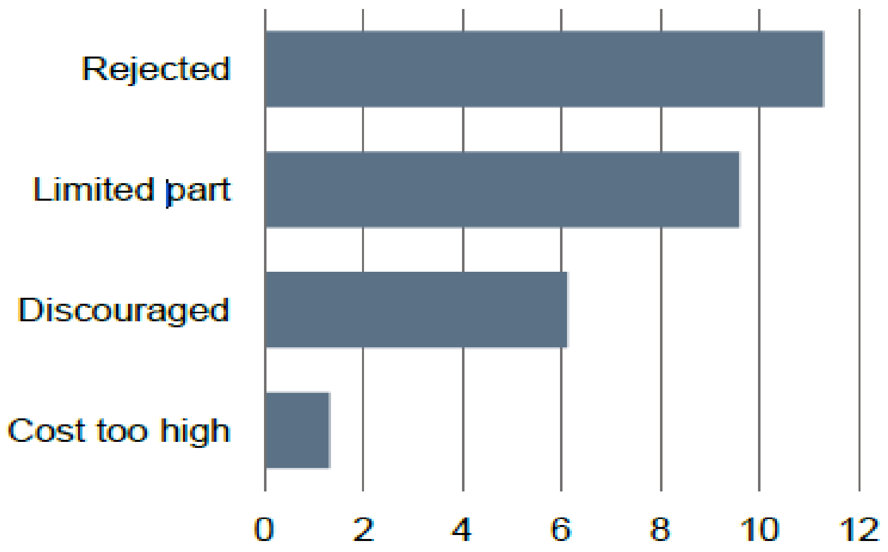

Figure 4.8: percentage of SMEs reporting obstacle when applying for bank loans.
Source: Deutsche bank, [October 2014].

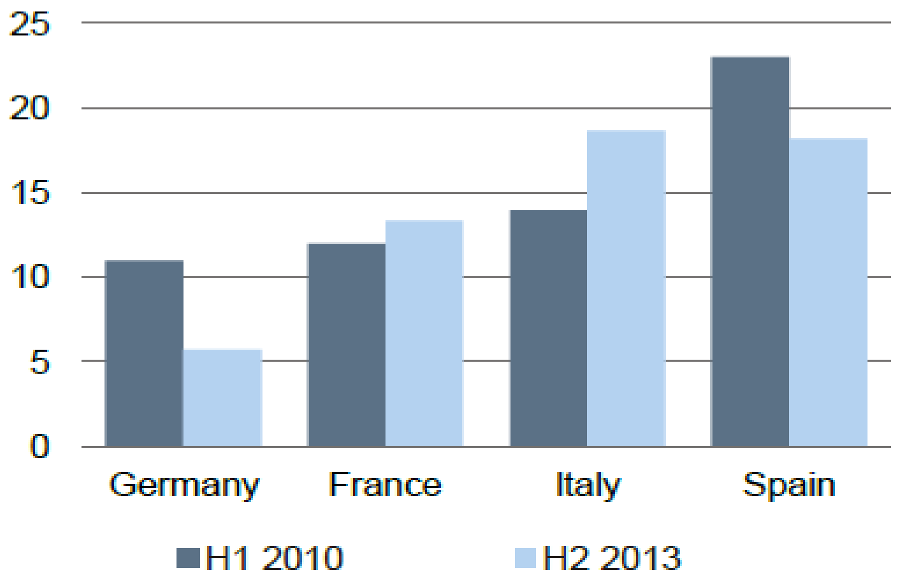

Figure 4.9: percentage of SMEs reporting access to finance as most pressing problem.
Source: Deutsche bank, [October 2014].

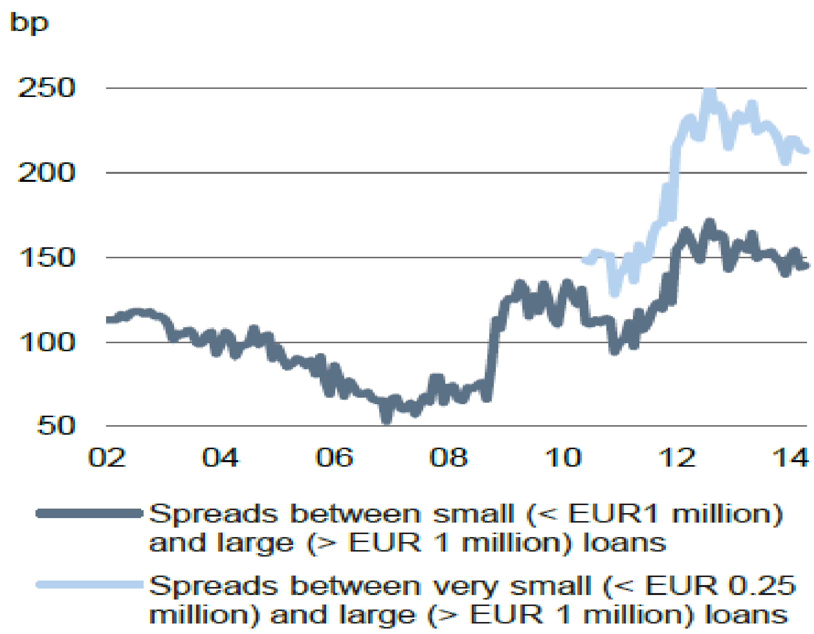

Figure 4.10: disproportionally high financing cost for SMEs.

Source: Deutsche bank, [October 2014].

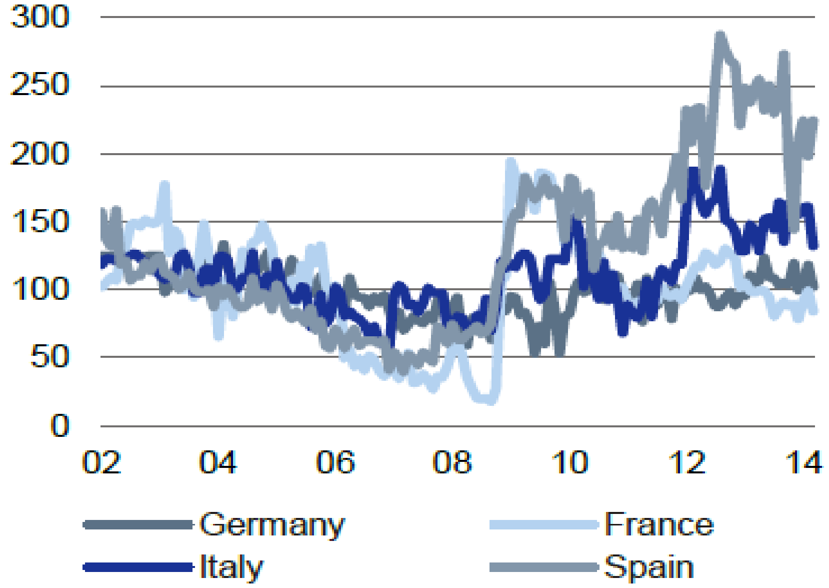

Figure 4.11: SMEs' borrowing costs by country.

Source: Deutsche bank, [October 2014].

As a result of that, it’s clear that SMEs need support, but that doesn’t mean just to provide funds, subsidies or favorable conditions; these measures, typically granted by governments, are not sufficient to solve the problems and are just limited to partially mitigate their effects.
There are also some specific bottlenecks for SME access to SCF solutions:

- SCF is relatively unknown from these subjects and this could lead to misunderstandings;

- SCF generates greater benefits to the buyers when is implemented with major suppliers;

- A lack of standardization brings high implementation, onboarding and transaction costs.

These are the reasons why it’s critical to make available solutions of SCF specifically addressed to the SMEs.

4.2.3 Critical players of SCF for SMEs

Now it could be interesting to make some considerations about the main relevant players who have the opportunity to act in support of these particular applications; for each of them are reported some possible guidelines.

Governments

As illustrated more in general in the previous paragraph, a targeted information campaign is required in order to encourage SCF and could be reinforced by good examples and regulations:

- Provide information on how SCF works;

- Introduce simple and clear rules to facilitate the adoption of SCF for the SMEs;

- Implement SCF schemes in which the government or the local authorities take the role usually played by the focal company.

Focal companies

It's very important that the big corporations understand their critical role as the focal point of the supply chain; in this particular context it means to act proactively to ongoing and involve their strategic small suppliers in SCF solutions.

To do that it's necessary to make some initial investments in term of evaluation and formation of the suppliers and in term of project management, in order to ensure them a free-cost adoption of these practices.

Moreover the focal companies should act primarily to enforce the relationships among the supply chain and to reduce the global risk of the network; the first aim should be to help their strategic suppliers in order to grant a more sustainable business in the long period.

Instead the big corporations usually try to exploit their bargaining power in order to get all the benefits arising from the SCF solutions, for example by extending their payment terms; it's reported below a very simple example of such a situation.

SCF solution: reverse factoring between a SME and a big buyer

Invoice: 5000€, Payment terms: 30 days, Interest rates: 3% (buyer), 6% (supplier)

Cost of a traditional solution for the supplier: $5000€ \times 6\% \times \frac{1}{12} = 25€$

Cost for the supplier by leverage the rate of the buyer: $5000€ \times 3\% \times \frac{1}{12} = 12{,}5€$

Benefit of reverse factoring: $\mathbf{25€ - 12,5€ = 12,5€}$

Savings on buyer financing costs by extending the payment terms:

+15 days = 6,25€, +30 days =12,5€, +60 days = 25€

Supplier savings from reverse factoring depending on the payment terms of the buyer:

30 days = 12,5€, 45 days = 6,25€, 60 days = 0€, 90 days = -12,5€

In this case the most important aim of SCF fails; in the short time the focal company gets a benefit, but in the long term this leads to a quick weakening of the supply chain.

SCF service providers

Another group of actors potentially interested in the particular situation of the SMEs are the SCF service providers, namely those who are commonly responsible to connect the various players of the scheme and to provide a wide range of auxiliary services, among which the most important is the technology.

Normally the most innovative operators provide web-based technological platforms including several different financing solutions, canonical and of SCF, which are usually funded by a bank or a conventional fund; in the case of a fund, the pool of investors can be really heterogeneous, involving governments or public authorities, insurance companies, pension funds, banks, privates.

Offering specific solutions for SMEs is not beneficial just for them, but it represents also an opportunity for the SCF service providers, since the related demand is growing very fast and there is no a very intense competition on the market.

Therefore there are some key points which a SCF provider should consider:

- It's important to project solutions available to as many players as possible, focusing also on the smallest firms, namely those who need more similar services;

  This is not easy and could require costly partnerships with financial institutions and risk management skills, but it's definitely possible, since few players started to offer similar services;

- Another critical point is the range of the solutions. SMEs usually need different SCF instruments depending on their particular situation, and consequently the variety could be a competitive advantage;

- A web-based platform has to be simple and flexible at the same time, in order to facilitate the ongoing of suppliers and the alignment of different information systems.

4.2.4 Examples of SCF for SMEs

Even if this field of application is just at the beginning of its development and there are still several steps to be completed, it was possible to find some interesting examples in that direction, promoted by private companies, governments and as well as international organizations.

A first example of a public solution supporting the SMEs financing dates back to a decade ago in Mexico and can be considered as a forerunner of a particular SCF practice based on invoice trading (Innovations in access to finance for SMEs, the Association of Chartered Certified Accountants, [February 2014]).

The project Cadenas Productivas, back by the state-run development bank Nacional Financiera (Nafin), created an on-line market place in which selected SMEs, accredited as suppliers of large and reliable buyers, can offer their invoices for sale to a panel of financial investors in return for immediate access to working capital.

Between its establishment in 2001 and mid-2009, Nafin's SCF program had attracted 455 big buyers and more than 80000 of their suppliers, and have advanced approximately $60 billion to Mexican SMEs, 80% of which received no traditional bank credit; moreover 20 Mexican banks and financial institutions lend via Nafin platform (Banco de Mexico, [2004]).

A more global and recent version of the last solution is provided by the International Finance Corporation[65] (IFC), through the Global Trade Supplier Finance program (GTSF), a $500 million initiative which started in 2010 and is specifically designed to advance working capital finance to development world SMEs selling to end-customers in developed markets (Innovations in access to finance for SMEs, the Association of Chartered Certified Accountants, [February 2014]).

As before, this scheme is a sort of web-based invoice trading platform based on the main principles of reverse factoring; the aim is to enable small and poorly collateralized borrowers to access finance at an interest rate based on the credit risk of their much larger buyers.

[65] The International Finance Corporation (IFC) is aninternational financial institution that offers investment, advisory, andasset management services to encourage private sector development in developing countries. The IFC is a member of the World Bank Group and is headquartered in Washington, D.C.,United States.

There are also some private companies operating towards this new business:

Atzec Exchange is a platform launched in 2013 to enable developing world and credit-constrained developed world SMEs to sell invoices issued to large buyers and already approved for payment; Aztec is based in Dublin and operates in 38 countries in the 5 continents.
The financial investors which are responsible for buying the invoices are mainly hedge funds based in London, New York and Singapore; the most relevant features of this solution are the discount rates of the platform, from 0.9% to 2% for 30-day period, and the advanced percentage of invoice value, up to 85%.

The Receivable Exchange (TRE) is a real-time online marketplace for working capital financing owned by The New Orleans Exchange Inc., funded up to now through several round of Venture capital financing; it’s a single invoiced enhanced exchange where sellers of invoices set the parameters and investors - like banks, hedge funds, asset-based lenders and family offices - compete in real time to purchase them.
In 2009 NYSE Euronext[66] acquired a minority stake and TRE was split into two businesses, one focused on Corporate Receivables (CRP) targeting Fortune 1000 firms and the original Small Business Program (SBP).
The challenge of the SBP platform is that the investors have to do their own due diligence on a market which has very little counterparty information; on the other hand the CRP platform asks investors to have the liquidity capacity to fund firms of a relevant dimension (Seller Based Invoice Auction Platforms, GBI, [2013]).
CBC Trade Finance, a non-bank trade financial company, offers post-shipment SCF solutions for cross-border trade with the USA and Canada; through the Supplier Early Payment program exporters are paid 100% as soon as goods are shipped and importers accept a trade draft providing the importer with up to 120-day open account terms.
The targeted markets are foreign SME suppliers and SME non-investment grade importers based in USA and Canada; the following figure 4.12 reports the CBC scheme:

[66] NYSE Euronext, Inc. was a Euro-Americanmultinational financial services corporation that operated multiple securities exchanges, including the New York Stock Exchange, Euronext and NYSE Arca; On April 4, 2007, NYSE Group, Inc. merged with Euronext N.V. to form the first global equities exchange, with its headquarters in Lower Manhattan.

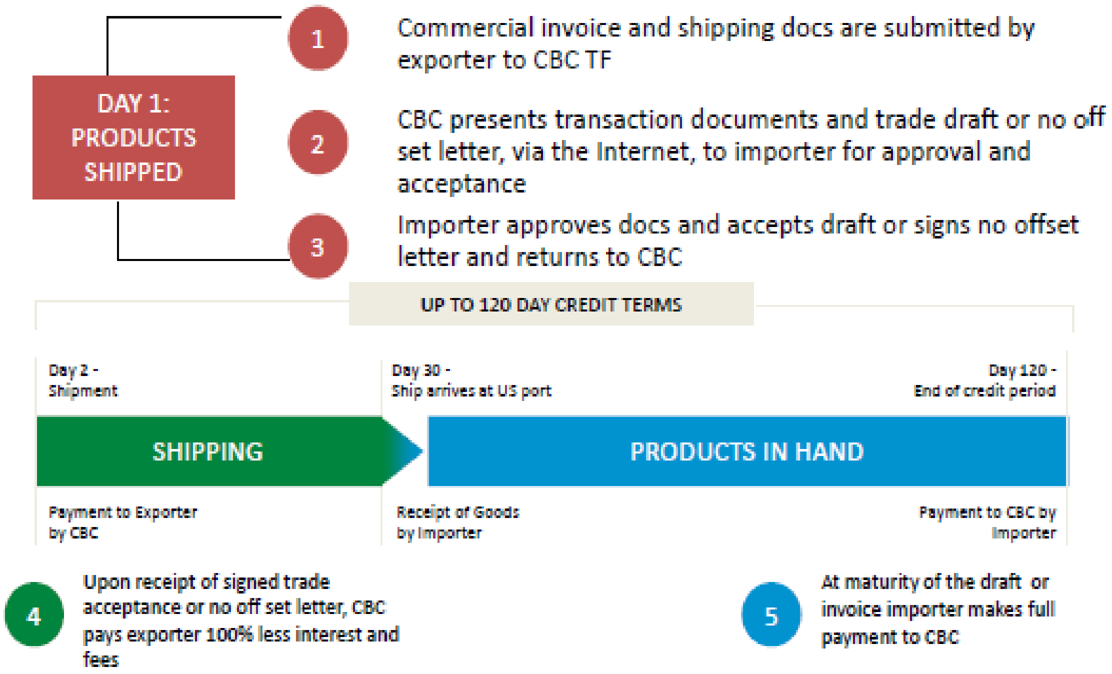

Figure 4.12: the CBC financing program for SMEs.

Source: SCF Payable and Receivable Solutions Guide, GBI [2012].

There are several benefits for all the different actors involved (SCF Payable and Receivable Solutions Guide, GBI [2012]):

- Importers: increased liquidity and improved cash flows, extended DPO, no additional bank debt, global access, incremental unsecured financing.

- Exporters: accelerated cash flows and liquidity, decreased DSO, 100% advanced rate, no collateral guarantees, increased sales potential.

- Banks: credit guarantee and collection of USA receivables, possibility to offer a unique solution to SMEs, increased business with importers and exporters.

4.2.5 Case studies of SCF for SMEs

PROMISE-TO-PAY ENGINE

General information

An interesting project led by a government and involving several different players is emerging in the Netherlands; the Dutch Ministry of Economic Affairs did the kick-off and currently the government is trying to engage all the related parties potentially interested in the scheme, knows as Promise-to-pay Engine (figure 2.21).

The program is specifically addressed to SMEs and is aimed to facilitate their access to SCF solutions; the idea is to provide new financing opportunities to these actors and, at the same time, to support the buyers by managing all the processes through a new single-interfaced entity.

Some pilot groups have already started, three at regional level and one based on collaboration between government and global corporations (Kickstart Supply Chain Finance Pilot for Financing SME, Windesheim University, [2014]).

A specialized research group placed under the Windesheim University was formed in order to investigate these new SCF solutions for the SMEs and to best develop this program (Chain financing programs for connecting the SMEs, Dutch Institute for Advanced Logistics, 2014).

Dutch SMEs in the economic system

The project takes inspiration from an analysis of the current conditions of the economic and financial system in the Netherlands, which moreover reflects quite closely the situation of entire Europe; the findings are summarized in the following key points:

- Three-quarters of SMEs debt capital is financed by banks (Financieringsmonitor, [2013]);

- Total bank lending to SMEs declined by an average of 2% in the period 2010-2012 and in the same period small loans decreased by 10% to 12% (Hoek Committee, [2013]);

- This decline corresponds to a reduction in outstanding loans to the SMEs of €4 billion compared to 2010 (Hoek Committee, [2013]);

- SMEs are paid later than the national average and the main reason for that difference is the negotiating power;

- Working capital is the main use for capital within SMEs, approximately 45% of the total (Financieringsmonitor, [2013]).

SCF current state in the Netherlands

SCF is a real alternative to get easier and cheaper financing and to improve the working capital position, but unfortunately up to now it's hardly reaching SMEs or not at all.
There are two main reasons for that:

- The onboarding cost of a small supplier is significantly more expensive due to the following factors: engagement, terms and conditions, legal documentation, invoice approvals, data management, handling of disputes;

- The benefits of SMEs' SCF for the buyers are much lower compared to large suppliers.

In fact the financial benefits of SCF for a buyer depend directly on the size of the supplier's procurement value, since it's possible to extend the payment terms.
It's definitely not easy for big buyers to understand that SCF is not just a question of short-term earnings; it should be a win-win situation in which the suppliers get an immediate financing benefit and buyers exploit the long-term advantages of leading a safe and sustainable-growing supply chain.
The consequence is that many SCF programs focus exclusively on major suppliers.
It's reported below the typical supplier base of a corporation, in relation to the cumulative procurement value (figure 4.13):

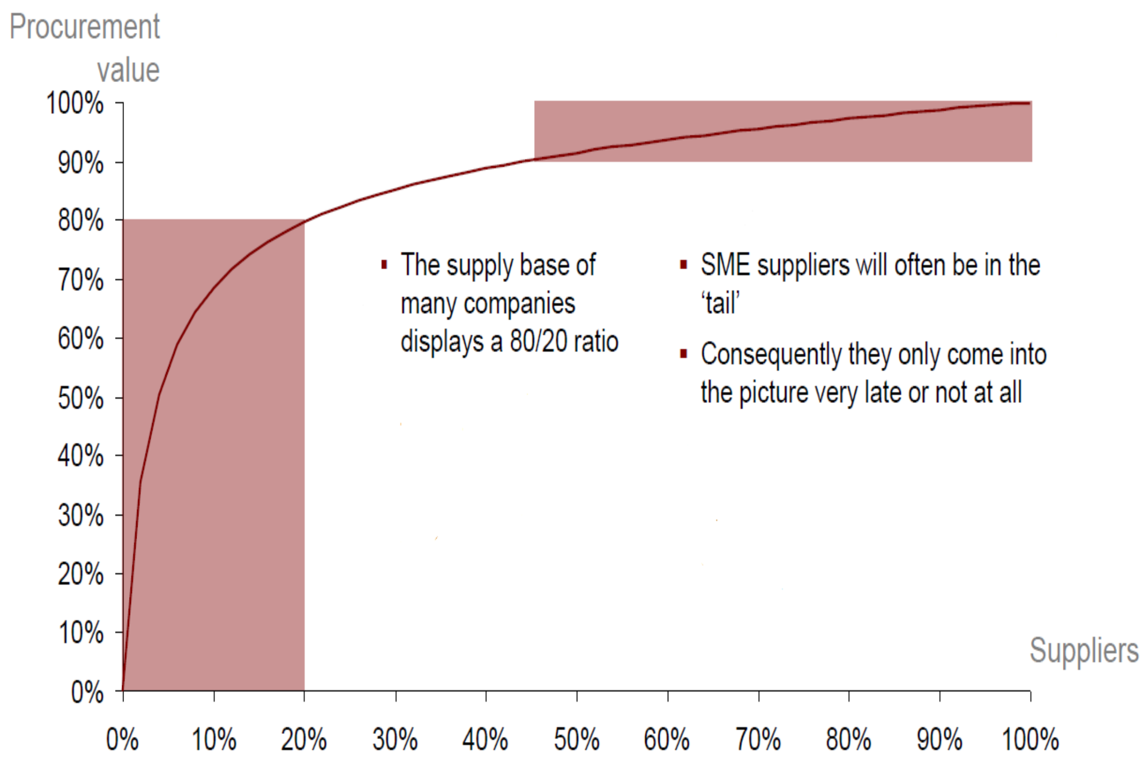

Figure 4.13: typical supplier base of a buyer in relation to the procurement value.

Source: Zanders, [2014].

SCF for SMEs in the Netherlands

Now it's clear why Dutch SMEs have a substantial potential of SCF in the long term.

These considerations were the starting point for the idea to develop a standardize platform for the Netherlands aimed to onboard on SCF also the small suppliers and to improve the efficiency of these solutions.

During the preparation of the project, it was carried out a study to quantify this unexploited potential; the sales of Dutch SMEs were divided according to the category of buyers, in order to understand which amount would be suitable for SCF.

According to the data of 2009 published by Zenders and based on Statistics Netherlands (figure 4.14), €127 billion of sales are suited and the estimated potential of SCF to the SMEs is approximately €9billion.

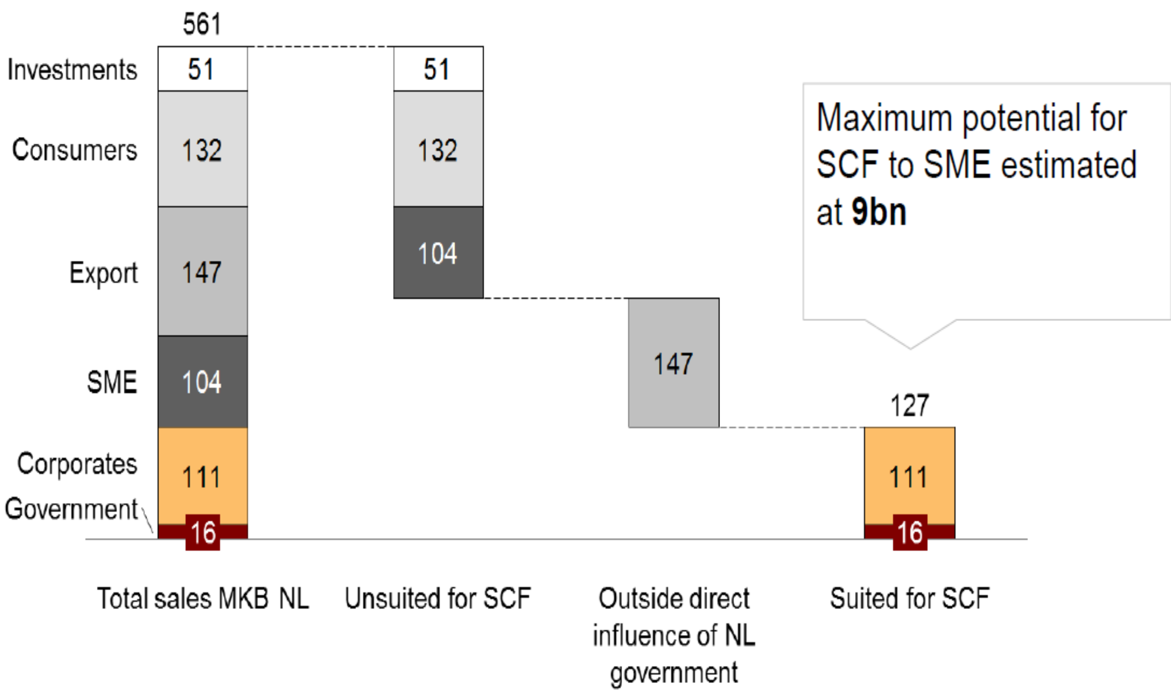

Figure 4.14: Dutch SMEs sales divided according to the buyers.

Source: Zanders, [2014].

Promise-to-pay scheme

The last quarter of 2014 was the kick-off of the Promise-to-Pay project, led by the Dutch Minister of Economic Affairs in collaboration with the Windesheim University and several other partners from both industry and financial sectors.

Considering the international relevance of this topic, also SCF experts from Germany, France, Italy and U.S. were involved in advisory sessions.

In the first quarter of 2015 the independent entity Promise-to-Pay will be launched: the target is to reach €100 million of SCF volume at the end of 2015, €1 billion at the end of 2016 and €5 billion at the end of 2018 (Kickstart SCF pilot for financing SME, Windesheim University, [2014]).

Promise-to-Pay engine is not just a platform providing working capital financing to a broader category of subjects, but it’s an entity which has to sponsor SCF, to provide information, to engage players; it also represents a single interface which facilitates and standardize the access to SCF for buyers and suppliers.

The figure below (figure 4.15) shows how is possible to extend current programs of SCF to the SMEs:

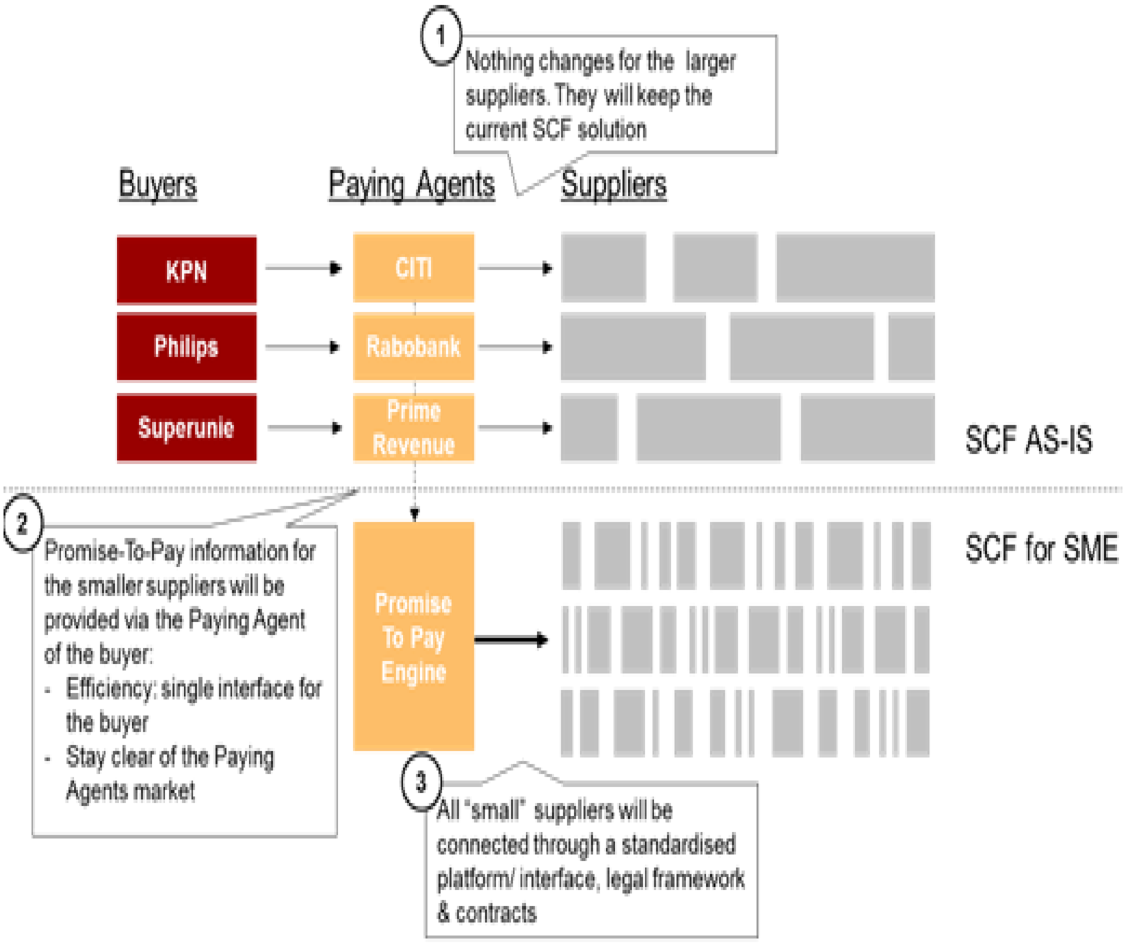

Figure 4.15: the Promise-to-pay Engine financing program.

Source: Windesheim University of Applied Sciences, [2014].

This new entity connects all small suppliers through a standardize interface proving solutions, information, contracts and connections; nothing changes for the larger suppliers, which continue to keep their current SCF solutions.

The main strength relies on the possibility for the buyers to involve all their suppliers and, at the same time, to work with a single interface combining efficiently finance requests with potential financers.

The following figure (figure 4.16) reports in detail how Promise-to-Pay Engine should work:

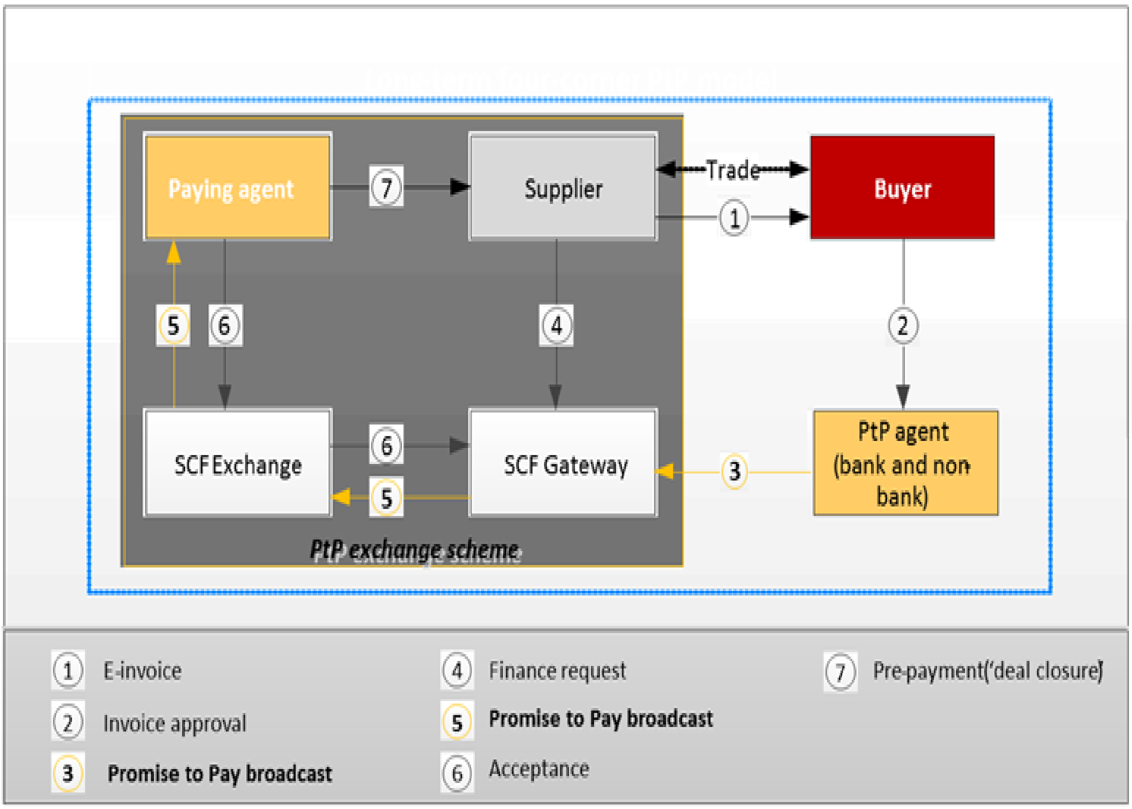

Figure 4.16: the Promise-to-pay Engine scheme.

Source: Windesheim University of Applied Sciences, [2014].

Once receiving the invoice, the buyer starts the process for its approval with the Paying agent, which can be a bank or a SCF provider; then the Paying agent connects with the Promise-to-Pay entity providing information and documentation and, at the same time, the supplier asks for finance.

After the confirmation from all counterparties, the platform combines finance requests with potential funders and provides cash to the supplier.

TAULIA

General information

Taulia is a technology service provider for supplier financing, founded in 2009 with a head office in San Francisco; it employs more than 200 people and is continuously expanding and looking for new markets and costumers.

At the end of 2013 Taulia network included over 50 buying organizations and the growing rate confirmed its average level of 6 to 8 new costumers per quarter, with a deep penetration in several industries including Utilities, Food and Beverage and Oil and Gas.

Up to now Taulia has a relevant presence in the U.S., Canada, UK and Germany and includes in its customer's list Coca Cola Bottling, Pacific Gas & Electrics, John Deere, Hallmark, PepCo, Tim Hortons and other Fortune 500 and Global 2000 companies; on the financial side, were established important partnerships with global financial institutions, like Citybank and Royal Bank of Scotland.

In addition to expanding the customer base, also the supply side presents significant numbers, with suppliers using Taulia's products in more than 100 countries and in 10 different languages.

Business Model

Taulia's solution is specifically designed for corporates to reduce their procurement spend by enabling automated and more effective capture of supplier discounts by providing their supply base with a means of financing their invoices.

The idea is to provide instruments helping big buyers to automate and maximize discounts to 100 percent of their supply base, since in particular the SMEs need flexible alternative sources of financing; all the several solutions of Taulia are based on two main strands of the buyer-centric schemes, which are Dynamic Discounting Management and SCF.

The offer includes a variety of different discount options to give buying organizations the opportunity of customizing their practices and fitting their business needs; the buyers can choose how to group suppliers and which type of instrument to offer, based on both recurring and one-time discounts.

Basically Taulia provides one integrated platform for supplier financing, e-invoicing and e-payments, supplier self-services and information management; this offer is addressed to big corporations but, at the same time, is very flexible and is thought to include all of their suppliers.

The larger suppliers can use SCF, and in this case the scheme involves also a financial institution partnered with Taulia, responsible to fund the solution, manage the financial risk and establish the discount rate; in general the interest is based on the credit risk of the buyer more an additional parameter, which can depend on the type of working capital financing and on other factors.

The smallest suppliers can use dynamic discounting, which is based just on the financial capability of the focal company; in this case the discount rate is identified by a bid-ask mechanism between the buyer and the supplier, and in general depends on how many days are requested for the early payment.

With this solution, corporates see a substantial increase in discount revenue by activating the upper end of the slope, the ability to take proportionally higher discount between day 0 and the discount date; at the same time the suppliers receive cheaper and more flexible working capital financing and are able to more accurately project their cash flows.

The mechanism of remuneration of Taulia doesn’t charge the suppliers to use its technology, while asks buyers to choose between an annual subscription fee based on discounts taken and a revenue share model based on discounts captured from dynamic discounting.

When it was launched, the platform was asked for a more comprehensive supplier financing offering to meet the needs of the entire supply chain; SCF was great for the top 25-50 most strategic suppliers of the focal company and dynamic discounting was fit for the mid to long tail of the supply base.

Later Taulia realized that there can be still a gap in the middle and it’s essential to add more flexible instruments able to combine the benefits of SCF and dynamic discounting.

This is why it was launched Taulia Enhanced Discounting, the first flexible supplier financing solution that allows buyers to completely customize the supplier financing offering and fit their need and the needs of the entire supply chain; this program ensures

focal companies to capture early payments discounts using their own capital, the capital of a third-party financial institution or a combination of both.
In that way is possible to cover also the central part of the supply base without impacting the balance sheet and shortening the DPO.

Competitive advantages of Taulia

Since there are several technology providers for supplier financing on the market, it's interesting to understand the main factors differentiating Taulia from the competitors:

- Taulia's programs are much more flexible of those of other service providers and are addressed to the entire supplier base. This is very important because in general the SMEs are hardly reached by cheap instruments of working capital financing;
- Taulia has recently signed out the "any ERP" agreement, which allows its solutions to integrate into all ERP systems. As a consequence, any company can use Taulia regardless of their back-end systems.
- Taulia makes it easy for suppliers to submit invoices by supporting many formats and protocols. It's also possible to manually upload files with-in the front-end of the platform;
- The solution is also build to help buyers controlling excess cash and managing liquidity. They have full control and flexibility for specifying liquidity limits, setting rates and segmenting suppliers;
- The portal is in real time synchronized with the ERP systems and this prevents discrepancies;

Future developments

One of the most important key factors for Taulia to be successful is to constantly monitor the environment and its evolutions by focusing on the possible future trends and costumers needs.
For this reason Taulia is looking for other markets in which these solutions could be appreciated and in general where there are serious problems of liquidity and working capital financing in particular for the SMEs; currently the next targets in Europe are

Italy and Spain, since the SMEs have a significant influence on the economic system and are still suffering from the credit crunch from the banks.
To reach these markets and to make available the entire range of its solutions, Taulia should establish partnership with local financial institutions and this is not an easy step.
Taking inspiration from this last consideration, another potential area of improvement for Taulia is the third-party financing offering; up to now there are no several partnerships with financial institutions and therefore suppliers with cash shortfalls have just few alternative financing options for SCF.

The following figures (figures 4.17, 4.18) report the simple and intuitive interface which the suppliers can use to manage their SCF and dynamic discounting.

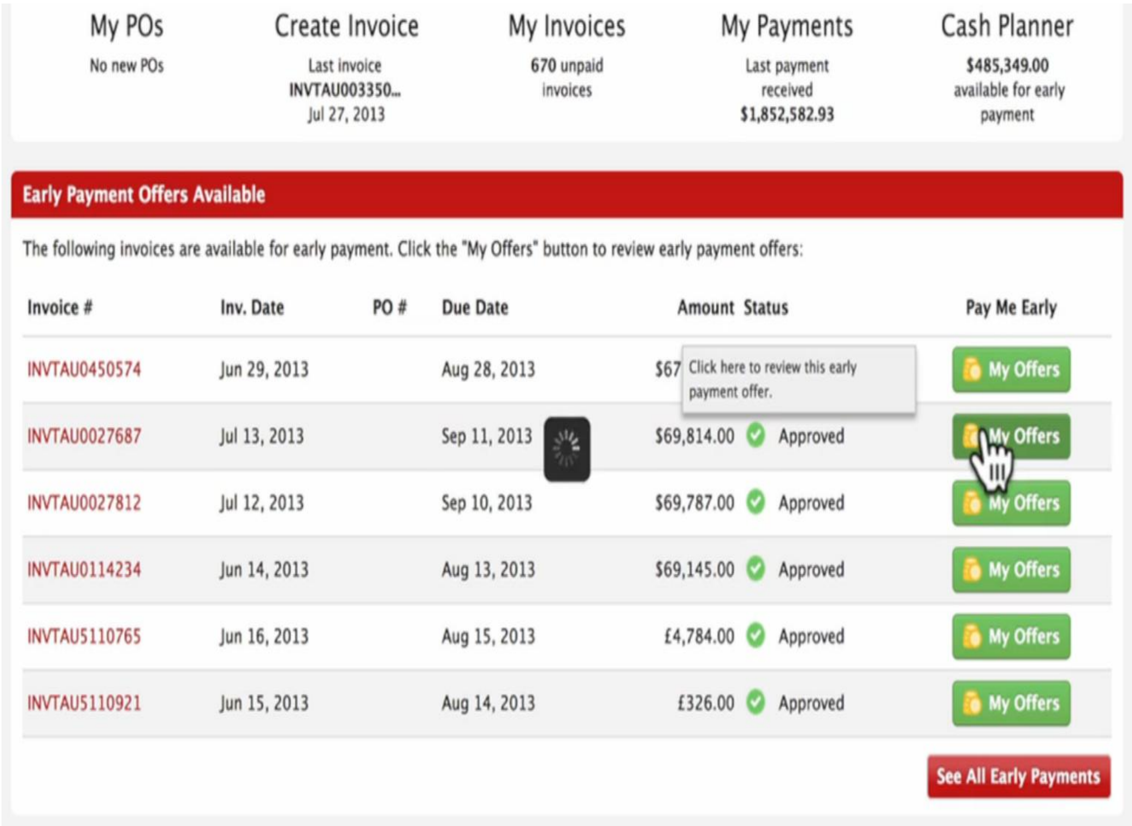

Figure 4.17: the Promise-to-pay Engine scheme.

Source: Taulia [2014].

The first screen is a general overview of the early payment offers available, with all the related information; there is also the possibility to load new invoices and to use the cash planner.

Figure 4.18: the Promise-to-pay Engine scheme.

Source: Taulia, [2014].

The second screen is the page through which the suppliers can select the early payment date and collect all the information on the discount rate and the other contractual terms.

OXYGEN FINANCE

General information

Oxygen Finance provides a business-to-business payments network that offers substantial income for organizations; it operates as an enabler for corporate and public sector organizations by unlocking income from their expenditure and transforming procurement and account payable functions into revenue generators.

The company's solution delivers additional income streams, as well as provides improved suppliers cash flows.

Oxygen finance is focused on the accounts payable side of the business and its approach offers solutions bringing together supply chain efficiencies, technology, finance and services; its main service is the Oxygen Early Payment program, which enables buyers to accelerate payment to their suppliers in exchange for a rebate.

The schemes of this service provider are also addressed to the smallest suppliers, which are automatically recruited and adopted into the network.

Moreover Oxygen offers risk management service to provide customers with the opportunity of internally financing their early payment programs; in fact its solutions are generally based just on the financial capability of the clients and no funders are involved up to now.

The company was founded in 2004 and is based in London, United Kingdom; its customers are mainly corporations or municipalities from UK, even if an expansion of the business in the U.S. is probably getting started.

Business Model

Oxygen is based on the principle that spend is an organization's greatest untapped asset; according to a governmental estimate, there are £37 billion of late payments outstanding in the UK economy, and it's common that organizations and municipalities delay payments routinely.

This is a very difficult situation for the suppliers, especially the SMEs, which have to struggle with liquidity problems; where the funds are available, the costs can be very high and often cannot be passed on customers due to the pressure to keep prices down.

Oxygen's Early Payment Scheme enables buyers, corporations as well as municipalities, to accelerate payments to their suppliers, in exchange for an early

payment fee, which is deducted from the supplier invoice at the point of payment providing a significant additional income stream.
In general this fee is based on a sliding scale and the suppliers can ask for an advance up to day 5 from the invoice date, as opposed to the typical payment terms; this is a voluntary scheme which allows suppliers to opt in or out.
The buyers can obtain several advantages: new income streams generating automatically from the existing spend, reduction of processing costs, invoice prioritization and increasing of compliance, zero investments and transaction fees, supporting of corporate social responsibility.
On the supplier side, it's possible to get improvement of cash flows, new lines of cheap credit, administrative savings, no-change to existing processes, zero investments and transaction fees.
Moreover added benefits are improvement in compliance to procure-to-pay good practices and in management information.
Finally, by reasoning in term of Tier-n supply chains, this solution offers an incentive to the suppliers to pay in turn their suppliers within the agreed payment terms, supporting in that way the entire network.
The goal of Oxygen Finance is to provide these services efficiently and quickly and to do that is not necessary to build a large service organization; it's better to bring into the scheme very strong partners to help deliver the solution.
For this reason, Oxygen has some important partnerships with consulting groups and technology providers, in order to be able to develop and deliver its services promptly and at the maximum quality level.
In fact the Early Payment technological platforms are developed and projected by Oxygen Finance, in order to satisfy the needs of its customers, but are built from specialized service providers.
On the other hand, Oxygen Finance is specialized in working with the clients to make peer-to-peer processes more efficient; in addition, since its solutions are available to everyone, this subject provides the buyers with support in understanding which suppliers are strategic and suitable for a similar scheme.

There are no additional costs and investments for the players involved and also the price of Oxygen is based on a new model; the idea is to provide the clients with the software without charging any tariff.
The buyer would like to see pay for performances and Oxygen is aligned with this model; in fact Oxygen receives a share only in case of new income for the organization.
The solutions are delivered with a methodical and effective approach, including the following sequential logic steps: mobilization, assessment, implementation and operation.
Each phase implies several streams of activity, like program management, process and change, technology and supplier on-boarding, in which are involved also experts from external companies.
An interesting point is that for Oxygen Finance is very important to engage all the interested parties and to involve the clients and their most strategic suppliers in the preliminary steps of the program; its approach is flexible and the commercial arrangements are established considering that all parties have to be satisfied and incentivized.
As a consequence, in general the early payment fee is negotiated together between Oxygen Finance and its clients to achieve a satisfying compromise for both; at the same time the average percentage of the fee has to be low enough to incentive suppliers to sign up the agreement.
The on-boarding of the supplier is the most important aspect of the implementation of the program and that requires to Oxygen resources and skills; since their engagement is critical, it’s necessary to understand properly the commercial relationships between the parties, to educate the suppliers on the opportunities and benefits of the solution, to manage the change through training, communications and support.

Competitive advantages of Oxygen Finance

Now is reported below a list of the main differentiating features of Oxygen Finance:

- These solutions don’t imply additional investments or costs for all players involved and the price is based on a new “pay for performance” model in which Oxygen realizes a profit only when the client see new incomes;

- The Early payment scheme is available for everyone and this is a great opportunity for the SMEs in the UK;

- Oxygen solutions' are suitable also for local authorities and municipalities. Since public experiences of supply chain financing are becoming more and more critical in the view of the current economic context, this is definitely a competitive advantage;

- Oxygen Finance provides the buyers with solutions suitable for their financial capability and this does not make critical anymore the engagement of a financial institution;

- The implementation of the scheme implies several preliminary phases in which representatives of all parties are involved and this makes possible to achieve a satisfying situation for everybody;

- Oxygen Finance is aimed to provide clients and their suppliers with very flexible solutions. In fact the technology is developed and projected in order to meet the customers' requirements;

- The Early payment scheme is not invasive and no process or system radical changes are required; moreover Oxygen Finance helps its clients to improve their efficiency and to focus on the most relevant aspects of the business, understanding what is really strategic and important in their upstream supply chain.

Future developments

Since flexibility is one of the most important strengths of Oxygen Finance, there are several subjects that could benefit from its offering.

Up to now the business is mainly addressed to UK clients, but the idea is to progressively extend the geographical boundaries, in order to achieve a global relevance.

In fact the demand for alternative sources of supply chain financing is going to growth over the next years, especially where the credit crunch is still affecting the economic system; such a situation gets worse where the SMEs strongly influences the GDP and the employment.

Potential markets are Italy, France and Spain, but to make a similar expansion is necessary to look for new funders and to sign agreement with local partners.

In the figure below (figure 4.19) is reported the typical Early Payment Scheme of Oxygen Finance:

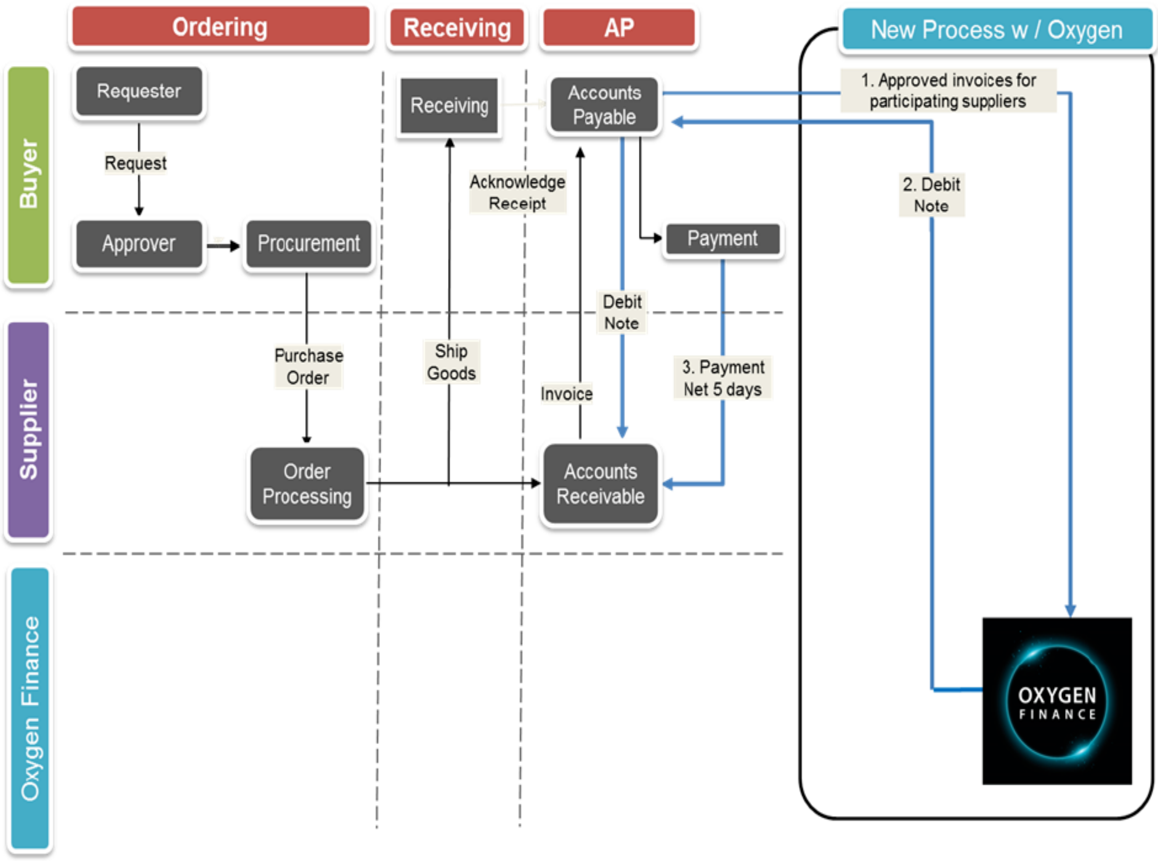

Figure 4.19: the Early Payment Scheme of Oxygen Finance.

Source: Oxygen Finance, [February 2013].

4.3 SCF for Tier-n suppliers

Currently, most of the SCF solutions provided by financial institutions and independent platforms are based on collaborative relationships between a focal company and its Tier 1 suppliers.

In the most advanced countries, especially in the Anglo-Saxon ones, these schemes are already known and are implemented efficiently, with limited financial burdens for all actors involved.

Up to now these instruments are just involving the central part of supply chains, namely the focal companies and their closer partners. Nowadays supply chains are becoming more and more complex and the recent trend seems to look forward to a progressive extension of networks; a significant representation of that is provided by Mentzer et al [2001] (figure 4.20).

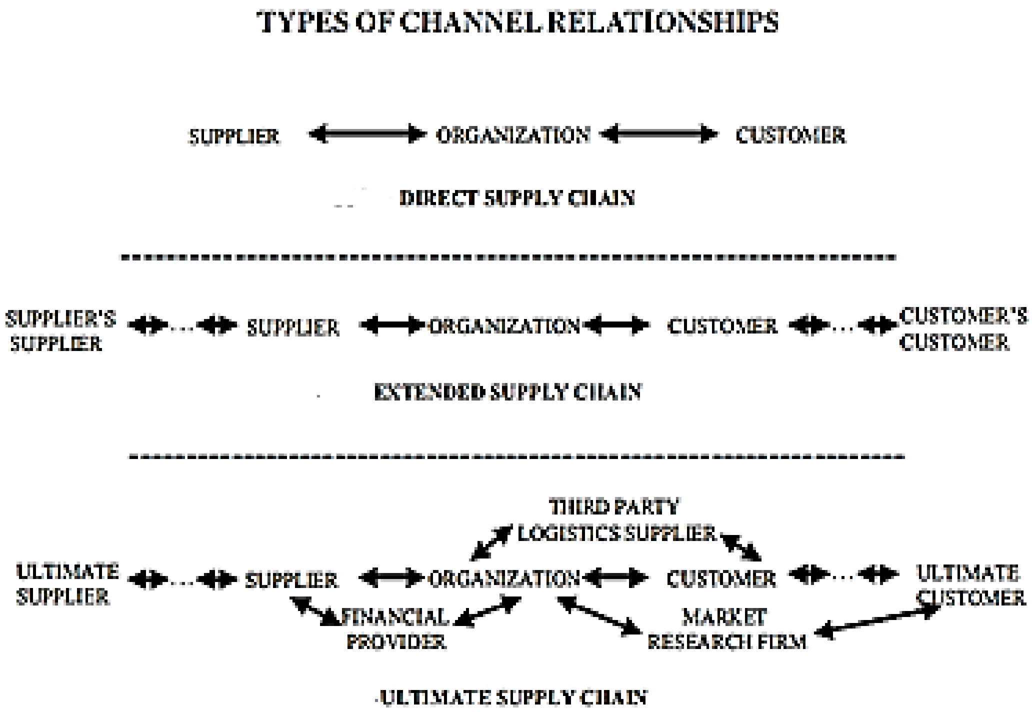

Figure 4.20: A popular supply chain definition.

Source: Mentzer et al. [2001].

The physical extension of supply chains should be followed by a related innovation of the financing schemes; in fact, to exploit all potential benefits of the network, it's critical to fill the gap between the financial flows and information and material ones.

As a matter of fact, the supply chains are often funded inefficiently, since companies tends to fund their total spend instead of their added value (Development in financial supply chain management – opportunities to grasp, Zender, [2014]).

Recently some global corporations have started to investigate solutions shifting from first tier suppliers upstream the supply chain to second, third, n-tier suppliers.

The main idea is to extend and enforce the relationships in the supply chains, reducing the individual financing needs; in particular these solutions are aimed to support the weaker players in funding their working capital easier and at lower interest rates, which are typically based on the better credit standing of the focal companies.

It's definitely not a simple issue, since the global risk of supply chains tends to increase depending on the number of players involved in the SCF scheme; risk management policies and vendor rating instruments take a critical importance in that view and consequently significant investments are required.

Nevertheless the global corporations could be able to sustain such an effort, especially considering the attractive opportunity of making their business sustainable in the long term by providing important facilitations to the strategic partners.

4.3.1 Supply Chain finance 2.0 and Tier-n SCF

Supply chain finance 2.0 is a new field of research partially connected to tier-n solutions, since they have in common the aim of going beyond traditional practices in order to exploit all the potential benefits of the network.

This project was launched by Michiel Steeman[67], and its goal is to accelerate the understanding, development and adoption of SCF models; more specifically SCF 2.0 aims to reach substantial benefits for corporations in the areas of operational enhancement, increased supply chain outputs, profits, cost reduction and risk mitigation (SCF 2.0, Michiel Steeman, [2012]).

The two main recent streams of the project are report below: (SCF 2.0: supply chain finance beyond traditional ways, The Paypers, [2014]):

[67] Michiel Steeman is the founder and chairman of Supply Chain Finance Community.

- Sometimes the suppliers ask for liquidity before the shipment of goods. Consequently SCF solutions have to be addressed also to the pre-shipment field of application;

- Since supply chains are becoming more complex and considering the criticality of collaboration for SCF, Tier-n supplier solutions are gaining importance; the next step is to develop solutions involving the most strategic players among all the tiers of the network.

The following picture (figure 4.21) presents the idea on which is based the evolutionary process of SCF:

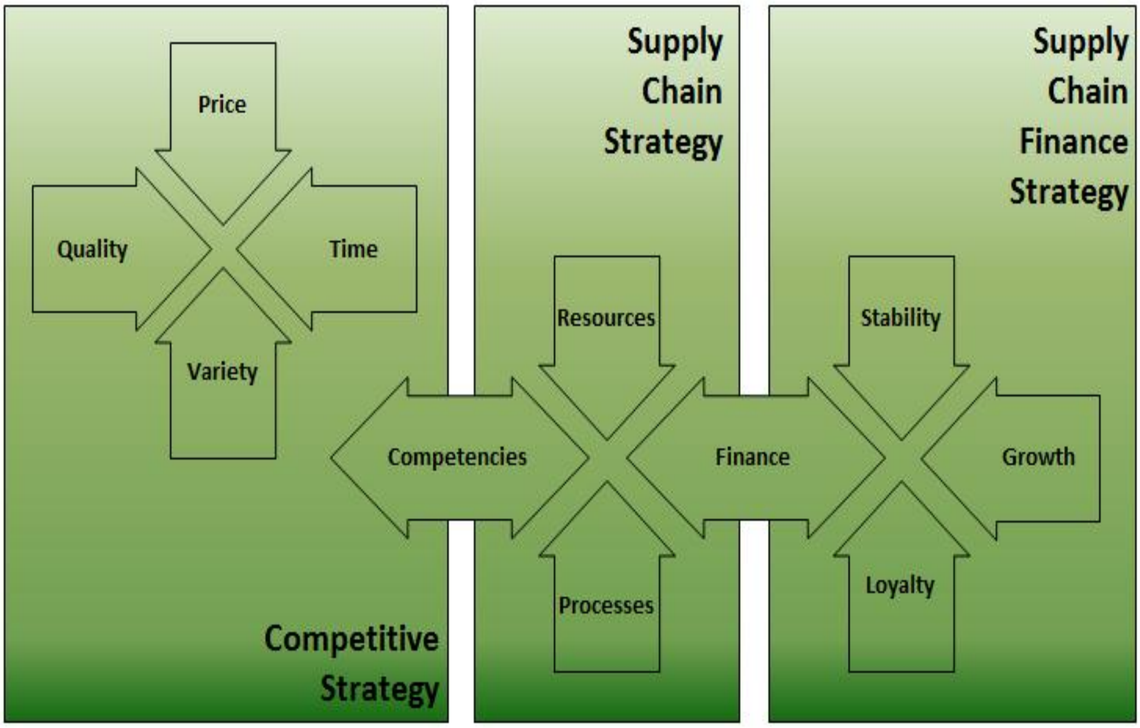

Figure 4.21: the progressive potential of a supply chain finance strategy.

Source: The Paypers, [2014].

4.3.2 The importance of understanding the supply chain as a whole

According to a study by PwC[68] and MIT, nearly two thirds of companies pay only marginal attention to supply chain risk reduction; looking at the first tier of suppliers is not sufficient anymore; it's now necessary a holistic supply chain management program.

Before implementing tier-n supplier financial schemes, it's good to have an overall understanding of the network; in particular focal companies aiming to extend SCF beyond tier 1 have to steer the following factors:

- Transparency and visibility over all the tiers, information sharing practices, collaborative strategies, composition of cross-functional teams;

- Engagement and formation of the players in order to be sure that all actors are able to understand the potential benefits of the program, the challenges, the threats and their role;

- Development of an appropriate risk management strategy, since risk is higher beyond supply chain tier 1.

Just to grab a basic idea of how different tiers of suppliers can influence the risk management policy of a focal company, it's useful to make reference to a study by Sedex[69]; it considers 10 companies which have been identified as achieving extensive engagement throughout their supply chain tiers, with a combined total of 3922 supplier relationships and 6775 audits (Going Deep, the case for multi-tier transparency, [November 2013]).

This study clearly shows that risks increase further down the supply chain; in this case the risk is measured by considering the number of non-compliances per audit (NCs), which are also classified in critical, major and minor, according to some predetermined criteria.

[68] PricewaterhouseCoopers is a multinational professional services network and it's one of the Big Four auditors.
[69] Sedex is the provider of the world's largest collaborative platform for managing and sharing multi-tier supply chain data.

The sample proved that companies are achieving engagement with 44,5% first tier, 47% second tier and 7,3% of third tier suppliers; moreover the second tier raises 18% more NCs per audit and the third tier 27% more NCs than tier 1 (figure 4.22).

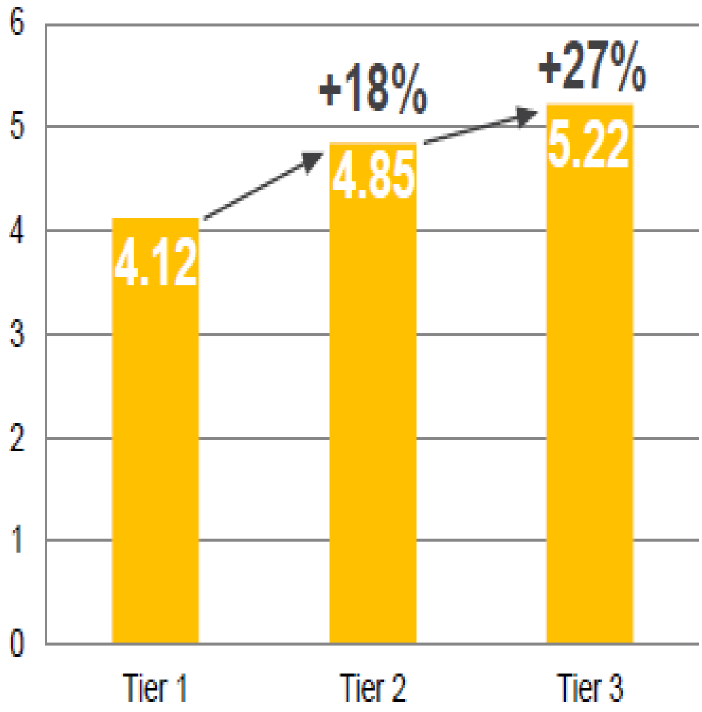

Figure 4.22: average number of NCs per audit per tier.

Source: Sedex, [2013].

These considerations make evident that tier-n transparency is necessary to properly understand supply chain risk; there is still significant work to be done to overcome the challenges of scaling-up supply chain management to achieve the adequate level of visibility.

Another important finding is that the issues are definitely more critical in the deeper tiers of the supply chain.

This effect is reported in the following picture (figure 4.23):

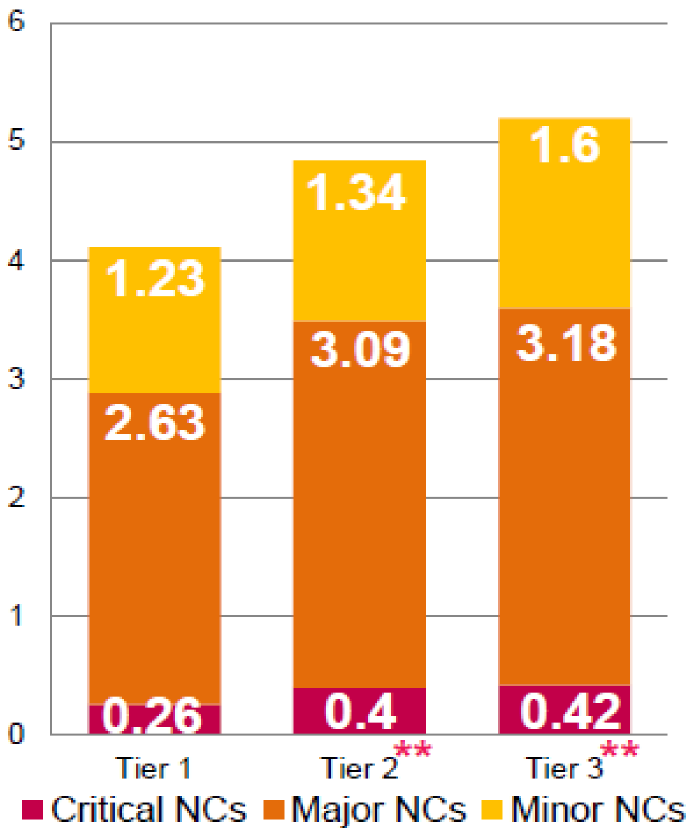

Figure 4.23: break down of the average level of NC criticality per tier.

Source: Sedex, [2013].

4.3.3 Opportunities and challenges of Tier-n SCF

The development of SCF models reaching beyond Tier 1 suppliers is an attractive field but very complex at the same time.

From the point of view of the suppliers, the situation is quite similar to the Tier 1 solutions, since the main benefit is the possibility to be funded easier and at the interest rate of the focal company, which is assumed to be lower; also in this case they have no additional costs and risks since the project is managed by the buyer with the collaboration of a bank or a service provider.

On the contrary the situation is different for the focal companies, which is at the center of a more complex supply chain, involving a higher number of suppliers; there is a wide list of investments in time and money related to a similar project:

- Firstly it’s critical for firms to map properly their own supply chain, looking beyond the first tier and targeting high risk areas for greater data collection;

- A detailed analysis of the supplier base has to be done, in order to identify the strategic partners which complying at the same time with the risk constraints of the company;

- Risk management takes a starring role in this context, since it’s very important to identify the threats and the strengths of the supply chain and to prioritize resources and efforts;

- Among these subjects, a further screening has to be done to discard those who are not interesting in a similar project due to technical reasons;

- An effective communication has to be adopted to make clear the ambitions and expectation of the company in front of the selected suppliers;

- At this step, there are several investments linked to the project management and the engagement of the suppliers, which have to be involved in the SCF cross-functional teams;

- After that, it’s possible to plan the most suitable financial solutions for the selected suppliers;

- Finally it’s necessary to establish a partnership with a bank and to look for a SCF technology provider; this can imply significant investments in cash and time.

Tier-n SCF is therefore a looking-forward business, which is mainly thought to benefit all the tiers of suppliers; for the focal companies it’s not a question of short-term financial benefits because, as mentioned before, there are several additional costs and investments at the beginning of the project.

The main objective for a big corporation is to reach the long term sustainability of the business and of the related supply chain, supporting the most strategic partners and enforcing the relationships; if all most relevant players are in a good condition, it will be more likely to fully exploit the potential of the network.
An important challenge for the focal company is to select properly the most strategic suppliers, since Tier-n SCF is not interesting and suitable for everybody.

4.3.4 Requirements for Tier-n suppliers

As illustrated above, going deeper in the upstream supply chain leads to new business opportunities, but implies also threats and risks that it’s better to monitor.
Tier-n SCF cannot be implemented with all suppliers and it’s necessary to make a depth screening, considering mainly the following factors:

- The supplier is strategic and its purchasing relationship with the buyer is direct;
- The purchasing spend of the suppliers has to comply with a lower limit, in order to make the project attractive also for the buyer;
- The supplier financing cost is higher than the buyer’s cost, otherwise there is no convenience to join the scheme;
- The supplier has an insufficient cash position and suffers from working capital financing problems.

4.3.5 An example of a software to screen the supplier base

In the automotive business is starting to be used a new electronic system for the evaluation of the suppliers and for the management of the complex supply chains, knows as Achilles; it’s an instrument useful for both OEM and its multi-tier suppliers, mainly addressed to improve the supply chain visibility and provide more structured information.

It represents a proactive approach to identify the exposures, evaluate suppliers from several points of view and suggest the best strategies with the right partners (Toyota Motor Europe Achilles Automotive Briefing, [May 2013]).

The following pictures report a schematic representation of the main functionalities of this system (figures 4.24, 4.25, 4.26):

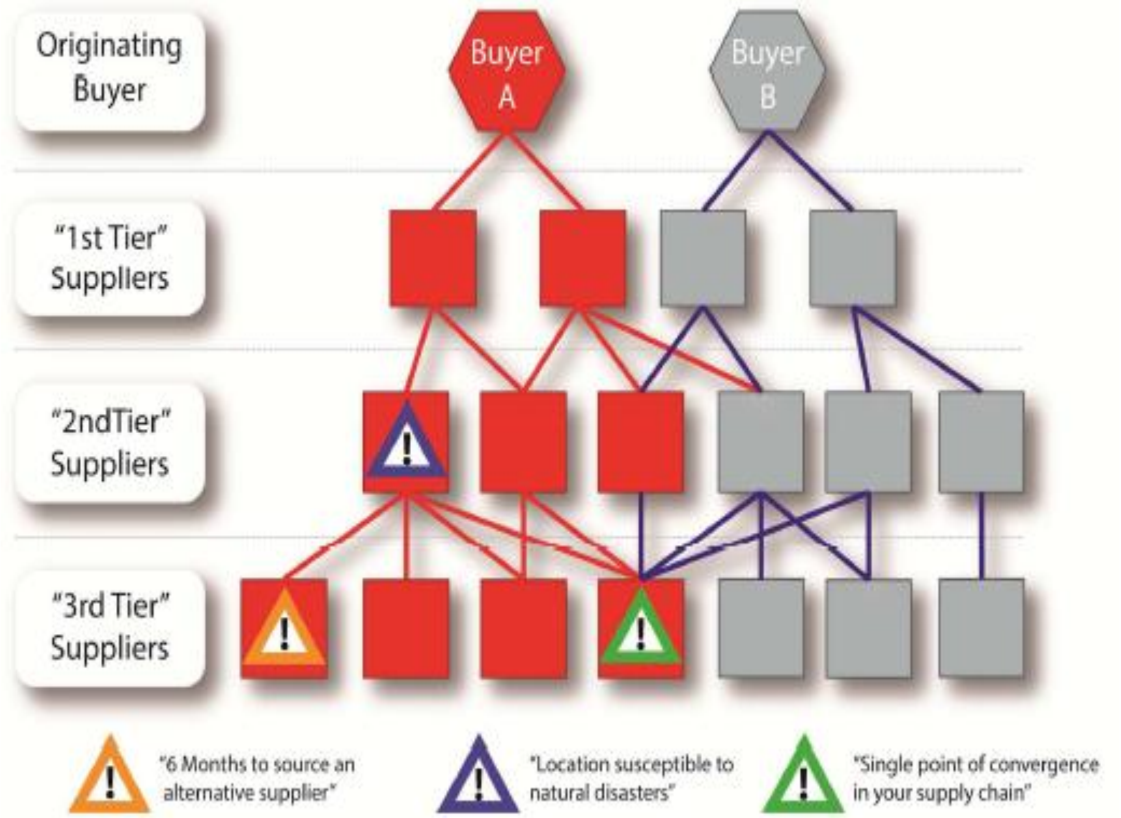

Figure 4.24: the supply chain mapping functionality of Achilles system.

Source: Achilles Automotive Briefing, [May 2013].

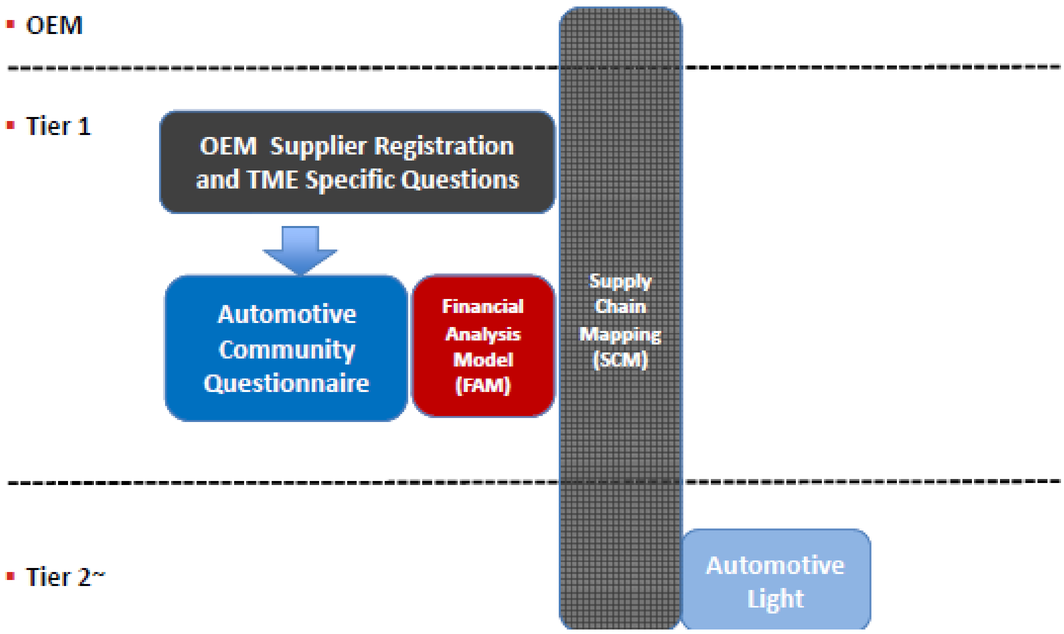

Figure 4.25: system structure and functions of Achilles.

Source: Achilles Automotive Briefing, [May 2013].

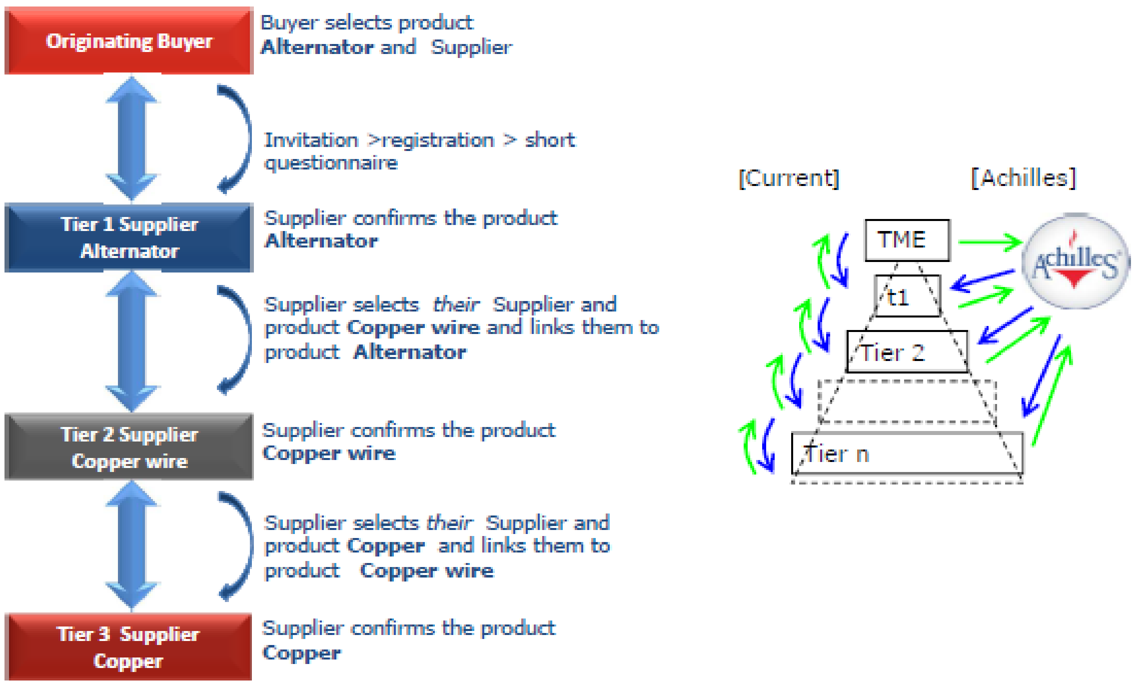

Figure 4.26: the operational processes of Achilles.

Source: Achilles Automotive Briefing, [May 2013].

4.3.6 Tier-n SCF case studies

This innovative field is just at an embryonic state, but it’s already possible to find some first ongoing projects, implemented and funded by global corporations or public entities.

PHILIPS

General information

Philips is a major Dutch electronics company founded in 1891 by Gerard Philips and his father; the firm had several transformations during its history and now is a global diversified health and well-being company, focused on improving people’s lives through meaningful innovations in the area of healthcare, consumer lifestyle and lighting.

Headquartered in Amsterdam, Philips performed 23,3 € billion of sales in 2013 and employs approximately 115000 employees with sales and services in more than 100 countries.

Businesses

As a global leader in health care, the company focuses on delivering the most technologically advanced products and solutions to help clinicians diagnosing, treating and managing many of today’s diseases; this business is organized in four strategic groups: imaging systems, patient care and clinical informatics, home healthcare solutions, and healthcare transformation services.

Philip Consumer Lifestyle focuses on delivering deeper experiences by tailoring technological solutions to variable local needs around the world and helping customers to improve their life; this business is organized in health and wellness, personal care, and domestic appliances.

Philips Lighting is a global market leader with expertise in the development, manufacturing and application of innovative lighting solution; its indoor offer is addressed to homes, shops, offices, schools, hotels, factories and hospitals while outdoors roads, public spaces and sports arenas are reached.

This business is organized in light sources and electronics, professional lighting solutions and automotive lighting.

Supplier sustainability

A very high percentage of components and products is purchased, rather than manufactured in house; overall, more than 90% percent of Philips' bill of materials come from outsourcing, long-term partnerships, original equipment manufacturers, and original design manufacturers.

In order to react to the ever more rapid innovation and the evolutionary environment, Philips works together with suppliers to innovate quickly and meet its customers' expectations; for this reason, strong relationships are build with strategic suppliers and the supplier base in constantly monitored and reviewed.

These relationships are based on creating a win-win for both parties through mutual trust, long term contracts, accountability targets and supply chain collaborations.

To create a solid supply base, the company leverages Philips' Group Purchasing, through consolidated commodity buying at corporate level; traditionally the BOM suppliers provide Philips with batteries, e-components, cables and connectors, motors, metals, packaging, plastics, power supply units while Non-product related suppliers focus on facilities, distribution, IT, professionals, travel and entertainment.

Supply chain finance

The SCF program was launched by the corporate Treasury function seven years ago and now the daily management is handled by the Procurement Finance department; as this is a really widened concept, several stakeholders are involved: corporate finance, legal, IT, procurement finance, supply chain management, SCF banks.

In 2008 several banks approached the company for SCF and it was decided to launch a pilot project with a local bank and a supplier; the test was successful and progressively the program was extended.

In 2010 it was also established an automated SCF platform together with Citybank and all the operational processes were improved through several changes in IT infrastructure and businesses.

Currently Philips efficiently implements SCF with its strategic supplier base; 270 suppliers in both bill-of-material and indirect-material spend commodities are involved, for a percentage on the total spend of 7% in 2011, 10% in 2012 and 13% in 2013.
The first aim of Philips was to optimize its working capital position; according to an internal estimate, SCF enables the company to generate significant cash flow savings (€175 million in 2013).
However especially suppliers realize increase in their working capital position and decrease in their average financing cost, since by joining SCF they are able to get payments ten days after sending the invoice, according with SCF Philips' agreement; moreover suppliers rely with an increased visibility into their expected payments, which facilitate a better planning of the cash flow strategy.
This SCF collaboration states that Citybank decides on which interest rate to apply for the suppliers' invoice and Philips doesn't have fully transparency about it; however the bank is not allowed to fix a rate higher than the sum of LIBOR and Philips' credit spread. On the other hand Philips is completely freely to choose the suppliers joining the program and Citybank has no decisional power.

Future developments of Supply chain finance

In 2014 Philips launched a R&D project on new SCF solutions in collaboration with the Supply Chain Finance Community; since similar financing schemes are already fully implemented with the most relevant strategic suppliers at Tier 1, the idea was to extend SCF at Tier 2, since there are minimum researches yet on these practices.
Philips works with thousands of Tier 2 suppliers, which certainly have a significant unexplored potential to improve the financial efficiency of the complete supply chain.
The project is daily handled by the Procurement Finance department in collaboration with the research group of SCF community; also the CFO participated at the kick-off meeting to sponsor and support the development of similar solutions.
In contrast to SCF at Tier 1, which implied significant financial benefits for the suppliers but also for Philips, Tier 2 SCF is not a question of money for the focal company, at least in the short term; it's a solution thought mainly for the weaker strategic players of the supply chain.

Philips is aiming to support the small supplier at the Tier 2 because in that way is possible to enforce all the supply chain and strengthen the relationships with its more strategic partners; those are necessary conditions to fully exploit the potential of the network and to grant a lasting and sustainable growth in the medium-long term.
In this case the focal company is not going to extend payment terms by leveraging its bargaining power and the suppliers can get all the savings arising from the possibility to fund their working capital at the buyer's interest rate.
Moreover there are no costs and risks for these subjects, since this project is fully managed by Philips, which would sustain all the investments necessary to analyze and assess its supplier base, onboard selected suppliers, define the agreements with banks and SCF providers and manage additional operational risks.
Of course Tier 2 SCF has stricter requirements than Tier 1, and up to now Philips has identified the following conditions:

- The project considers cases in which there is already a direct purchasing relationship buyer- Tier 2supplier (figure 4.27);

- The purchasing spend of the supplier is not less than €2,5 million, in order to make the solution interesting also for Philips;

- The supplier financing cost is higher than Philips', otherwise it would not be convenient for the supplier to join the solution;

- The supplier has an insufficient cash position.

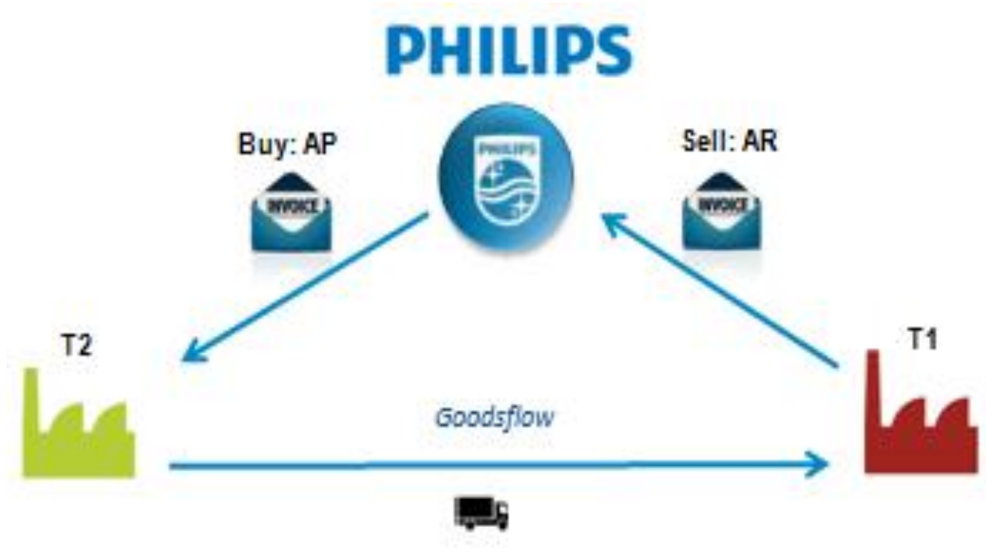

Figure 4.27: direct purchasing relationship between Philips and a Tier2 supplier.

Source: SCF 2.0 Research Philips, [September 2014].

It’s clear that at the end of the screening process there is a limited amount of suppliers available for the implementation of a similar scheme.

The project is still in progress and there are several things to be defined, depending on the next future developments:

- The funder could be Citybank, with whom Philips has already several successful collaborations at Tier 1. Nevertheless, it’s also possible to make arrangements with local financial institutions which probably have more visibility on near small suppliers;

- The technology platform can be developed by the bank or by specified SCF technology platform providers; in fact, depending on their dimensions and know-how, Tier 2 suppliers may need solutions and instruments ad hoc, not traditionally offered by pure financial institutions.
  Up to now, Taulia has been considered an interesting possibility, since is one of the most relevant providers of SCF for SMEs at international level.

In the figure below (figure 4.28) is reported how Philips can structured Tier 2 SCF with its strategic suppliers:

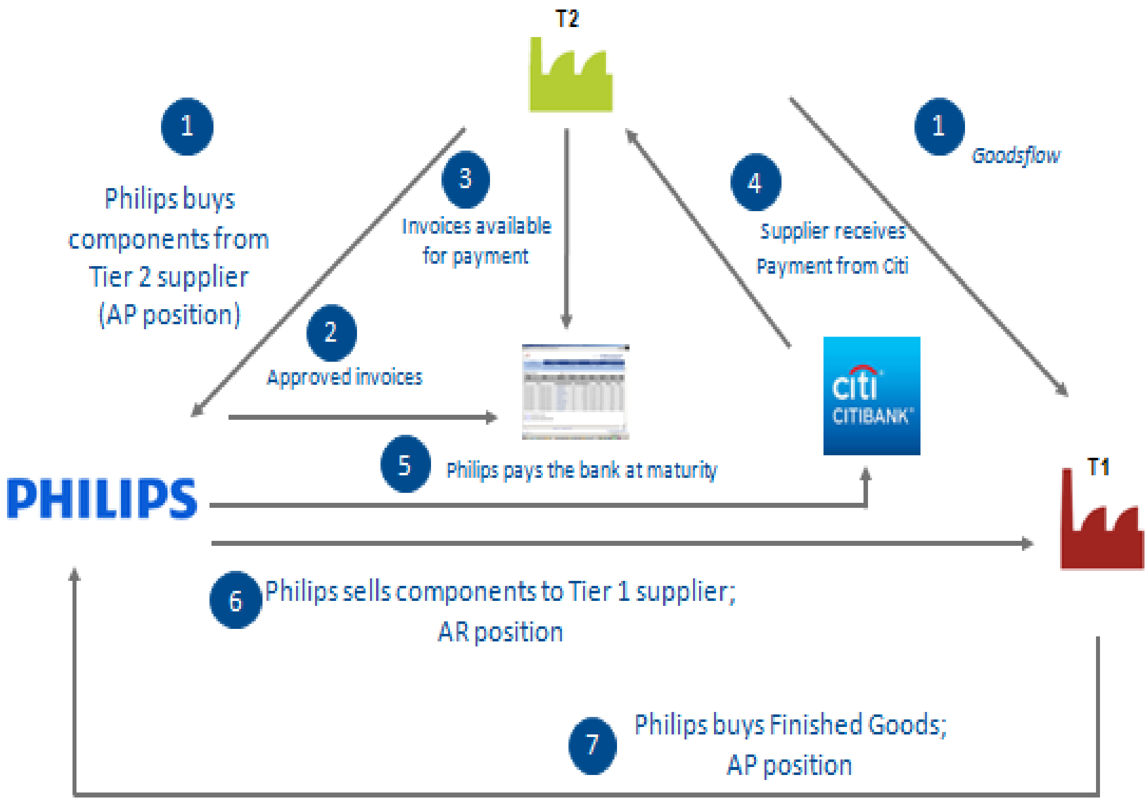

Figure 4.28: a possible Tier2 SCF solution at Philips.

Source: SCF 2.0 Research Philips, [September 2014].

A public-private Tier-n SCF Project

Another example comes from France, where was launched the RCSM project – Risk, Credit Chain and Supply Chain Management Project – aimed to turn the excess working capital into cash through an improved operational and financial collaboration between corporations and their network of tier-n suppliers.

This project is supported by the Pole de Competitivite Finance Innovation, a cluster of public associations, regional and national entities, public and private financial institutions and companies, European financial associations like EuroPlace (Finance Innovation – Pole de Competitivite website, Paris EuroPlace website).

It includes as key partners research labs specializing in SCF, a major aircraft manufacturer, a leading bank and Kyriba[70] and it is led by Say Partners[71].
The first goal of RCSM is to design a collaborative working capital management model between buyers and their network of tier-n suppliers, in order to achieve a win-win situation and bypass the traditional reverse factoring schemes, which only address post-shipment financing.
Moreover it's possible to design new financial products specifically addressed to SMEs involved in projects driven by a big buyer.
Finally the last idea is to launch an advanced SCF technology platform representing a marketplace between buyers and sellers; it should provide extended visibility in the supply chain and facilitate the interconnections between players (Researching SCF best practices, Schnapper, [October 2014].
In the figure (figure 4.29) below is reported the financing scheme of RCSM:

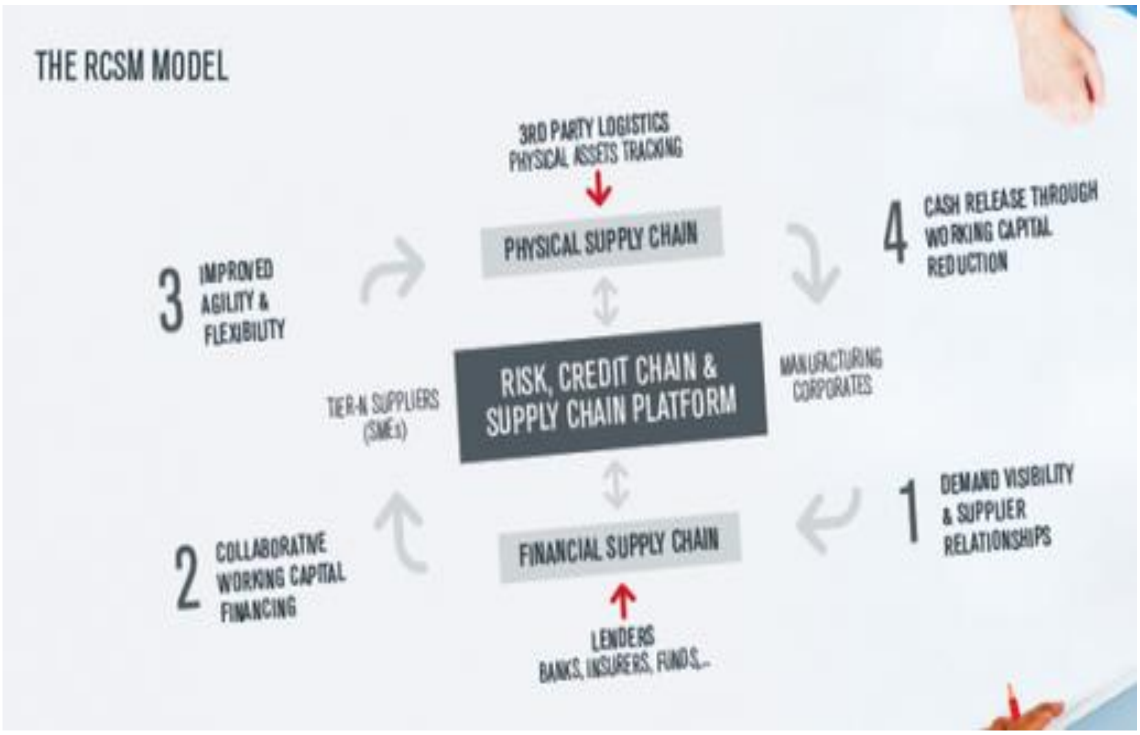

Figure 4.29: the financing scheme of RCSM.

Source: Researching SCF best practices, [October 2014].

[70] Kiriba is a global leader in providing SCF technology platforms.
[71] Say partners is a French supply chain advisory specialized in the manufacturing sector.

5 Conclusions

This chapter represents the conclusion of the work and is mainly aimed to present the answers to the research questions and to summarize the most important considerations about the related topics.

In addition, considering the information and the most relevant empirical evidences from the case studies, some interesting managerial implications are reported in relation to SCF and their future developments.

Finally the chapter concludes with the limitations of the work and the possible future researches, since SCF is a really complex topic and its potential has just begun to emerge over the recent years.

5.1 Answers to the research questions and considerations

RQ 1. **What is the current state of SCF in Europe?**

The analysis focuses on the most relevant European countries and takes in consideration the benefits, the opportunities and the challenges for the actors potentially involved in these financing schemes; moreover it is reported an overview of the main solutions available on the market and some possible classifications.

This is the most theoretical part of the work and represents the conceptual basis of the thesis; the answers to these questions have been provided through a deep analysis at national and international level of the existing literature.

It is not easy to report a univocal definition of SCF since there is no yet a universally accepted terminology about this topic; moreover the amplitude of a possible definition depends on the interpretation given to the word.

On the other hand, it was possible to define the most relevant concepts and implications of this discipline, which is a set of non-canonical working capital solutions and financial flows optimization practices aimed to reduce the gap between the physical and the financial supply chain; in a view of the current financial and economic environment, it is critical to leverage the potential of innovative schemes which extend the collaborative logic and the global vision of the modern supply chains also to the financial side.

This first part focused also on the several players potentially involved or affected by this set of solutions and basically four main categories were identified together with their related benefits and opportunities, since well-implemented practices of SCF can imply win-win situations: buying companies, suppliers, financial institutions and service providers.

Another interesting theoretical point taken in consideration by this work is the possibility to classify the solutions available on the market; considering the information collected through the literature analysis and the technical reports, three classifications have been identified, each of them based on a different interpretation of the term SCF.

Firstly it is possible to make reference to the buyer centric vs seller centric solutions, in which SCF is seen as a limited tool of alternative financing solutions thought especially for the suppliers; in this case the discriminating criteria is based on who plays the focal role in the scheme, which can be the buyer (early payments, dynamic discounting, reverse factoring) or the seller (factoring, invoice discounting, inventory financing).

Another interesting classification is the one referring to events or triggers in the supply chain that can be used to release cash and to reduce the cost of financing for that chain; the purpose of both is to enforce weak working capital positions and to reduce the risk in upstream supply chains.

Pre-shipment schemes are based on planning, managing and monitoring cash flows along the supply chain taking place before the delivery, quality control and invoice release to the buyer (advance payments, inventory financing, working capital financing).

Practices taking place after the delivery, quality control and invoice release are classified as post-shipment solutions; those imply that the buying firm actively manages cash flows, rather than simply demanding extended payment terms (factoring, reverse factoring, electronic payment platforms, SCF); in this classification SCF is seen as an more efficient and advanced evolution of reverse factoring, based on an automated platform and including a broader range of players.

The suppliers pay interest rates according to buying company’s credit rating, which is usually much lower than the seller’s one, but in contrast to reverse factoring SCF

implies a more holistic approach, by the implementation of a relationship between many sellers and a bank, instead of the sum of different disconnected buyer-supplier dyads.
Finally there is another strand which considers SCF as a wider range of financing solutions and collaborative practices of cash flows management; in this case the classification is featured taking in consideration the level of ICT and the depth of collaboration between the different players.
Three groups were identified, ordered by increasing technology and collaboration:

- Traditional solutions: invoice discounting, factoring, reverse factoring;

- Innovative solutions: SCF, dynamic discounting, clearing house, extra-bank invoice discounting;

- Collaborative solutions: VMI, consignment stock, CPFR.

RQ 2. **What are the future developments of SCF in a view of the current financial and economic context in Europe?**

Considering the peculiarities of the European markets and the current financial situation, the investigation focuses on the next steps of SCF in relation to its unexploited potential and to the conditions of the weakest subjects of the economic system.

In a view of the recent European financial and economic context and the related difficult situation of several subjects, three SCF future developments have been identified; for each of them the analysis focuses on the key factors and the main criticalities for the weaker supply chain members, the most relevant players and their supportive actions, the related SCF innovative solutions.

Governmental experiences of SCF

The first insight was related to the governmental experiences of SCF, namely schemes in which the government takes the role usually played by the focal company, or just instruments funded and sponsored directly and indirectly by the public authorities.

There are several reasons for which SCF is very interesting for governments:

- It represents a source of new financing alternatives and therefore sustains investments, growth and national employment;

- It can be specifically addressed to starts-up business and SMEs to support the innovation of a country;

- It enforces the relationships between supply chain members and reduces the global risk;

- It represents a bridge between the physical and the financial flows and it exploits all the potential of the digitalization;

- It offers a new business for banks and service providers and, at the same time, it diversifies and extends the financial system of a country.

The governments should intervene in order to support these new practices and to overcome the barriers which are still limiting their development; in fact up to now several subjects are not aware of the potential of SCF and there is no a lot of structured information available; moreover investments in cash and time are necessary to be successful and in general only the big corporations can sustain these efforts.
In addition SMEs and Tier-n suppliers can hardly benefit from SCF solutions, since ad-hoc schemes are not so common.
By investigating the current situation in Europe and analyzing the possible future evolutions of the environment some interesting guide lines for governments were identified:

- Sponsoring of solutions and provision of public information;

- Engagement of the most relevant players of the economic system;

- Introduction of regulations, directives and simplifications in favor of SCF;
- Funding of the most innovative and interesting schemes;
- Implementation of public solutions of SCF.

SCF for the SMEs

SMEs are in general the weakest subjects in the current economic system, suffering from several factors; working capital constraints, lack of liquidity, fix capital financing constraints, limited investments alternatives, impossibility to get assessed in term of risk and future potential, lack of know-how, interest and financial education.
At the same time, they play a critical role for the employment, the investments, the innovation and the economic growth of Europe; therefore it is too important to provide ad-hoc solutions.
In fact the SMEs have few alternative of financing, based mostly on the bank loan system and they suffer from credit crunch and increasing late payments.
Moreover their interest rates are exorbitant if compared to those of the big corporations, with different situations depending of the country; finally the diversity and peculiarity of these firms imply in general lack of standardization and high transaction costs.
Combining all these consideration, it is interesting to identify the most relevant players in that view and what are the possible supportive actions.
As cited before, governments could leverage their funds and decision power to implement direct and indirect actions addressed to spread knowledge, regulate and simplify, fund and implement public schemes.
Also the focal companies play a critical role in the supply chain and should exploit their bargaining power in a positive way; they can act proactive and invest to engage and form the suppliers and to establish convenient agreements with financial institutions and service providers.
In addition these big corporations can launch innovative projects of SCF and the related best practices could be shared with universities and specialized communities.

Finally an important role is played by the service providers, since they connect the several actors of the supply chains; they can introduce flexible technological solutions addressed to a wider range of subjects and provide ad-hoc solutions for the weaker actors.
They could be also able to make partnerships with different categories of investors and to provide low cost technology platforms and services.

Multi-tier SCF

Since the economic system is getting more and more complex is very important to have a complete vision of the entire supply chain and to look over the firs tiers; SCF solutions in fact hardly reach the strategic actors before the first tier of the supply chain.
It is necessary a different approach, based on more visibility and transparency over all the tiers; the engagement and the formation of the multi-tier strategic players is the next step to make clear the benefits of these programs.
Of course an adequate risk management strategy is required, since the risks are higher over the upstream levels of the supply chain.
A focal company should map properly its network and evaluate its supplier base, in order to reduce the risk and select the most relevant suppliers; in addition the suppliers have to be formed and engaged and it is necessary to make partnerships with banks or service providers in order to develop ad-hoc solutions.
If similar projects are implemented successfully, it is possible to strengthen the relationships between the strategic partners and to fully exploit the potential of the entire supply chain; moreover, the business could gain sustainability in the long period.
On the other hand, also the smaller and upstream suppliers can benefit from SCF, without any additional costs and risks.
Of course some requirements and constraints have to be taken in consideration:

- The suppliers should be strategic and with a strong and direct relationship with the focal company;

- The purchasing expenditure should be greater than a minimum pre-established threshold, in order to make convenient the solution also for the focal company;

- The supplier´s cost of capital should be higher than the focal company´s one;

- The supplier has few financing opportunities and suffers from liquidity problems.

RQ 3. **What are possible solutions in relation to these future developments and the most relevant players in that view?**

For each future development it is interesting to understand which players could have a critical supportive role and why and, in that view, which solutions could be implemented; the analysis reports theoretical implications and some small case studies at European level.

A first result of this part of the thesis comes from an empirical analysis of the governmental experiences of SCF at international level; in this regard, the investigation considered only countries in which SCF is already known.

This general overview reports a very different level of implementation of similar actions across the countries and, in addition, different types of interventions.

Considering the large amplitude of governmental supportive instruments observed, it was found useful to build a classification; taking in consideration the mutual similarity of the programs and the public level of involvement, three categories were identified: direct actions, indirect actions and other actions (table 5.1).

This review clearly assigns the leading role to the UK; the British government made impressive efforts in the last years, in particular during the two recent financial and economic crises; the knowledge of SCF is increasing due to the public sponsoring and more organizations can now benefit from the several advantages.

Moreover some British public authorities are implementing their own SCF schemes and playing the role of focal subject of the supply chain and this is an exclusive initiative in the international scene; finally impressive progresses were made in providing ad-hoc solutions of SCF for the SMEs, since it was supported the emergence of specialized service providers.

Actions	Description
SCF direct actions	1) Development of a governmental scheme of SCF in which the government palys a focal role. 2) Public financing of SCF service providers, web-based platform operators, private global corporations or focal companies. 3) Public financing of SCF technology or infrastructures. 4) Public-private collaboration in SCF researches. 5) Regulations affecting directly SCF. 6) Public reporting on SCF.
SCF indirect actions	1) Governmental sponsoring of SCF and engagement of the most relevant players. 2) Regulations or directives affecting indrectly SCF. 3) Public financing for accademic entities investigating SCF. 4) Financing for the digitalization of the processes.
Other programs	1) Regulations affecting all alternative financing sources. 2) Financing for SMEs. 3) Financing for venture capital and crowdfunding. 4) Programs for the reduction of payment terms.

Table 5.1: a general classification of governmental actions

Another interesting and active country is the Netherlands, in which government, focal companies, universities and financial institutions are cooperating to develop important projects of SCF addressed especially to the SMEs and the Tier-n suppliers.

Finally Germany and Italy are a bit in late from the SCF point of view, but considering the characteristic of their economic system, they resulted as high-potential countries.

The second part of the empirical analysis reports some small European case studies for each future developments previously studied; the information collected are based on web researches, technical documentation and semi-structured interviews.
As regards the governmental experiences of SCF, it was analyzed the business scheme of an electronic early payments platform, Urica, funded by the British government; moreover it was taken in consideration a public solution of SCF directly managed by the National Health System Agency in England.
Referring to SCF for the SMEs, the focus was on an innovative project, Promise-to-pay Engine, conducted in the Netherlands and involving the government, focal companies, universities and financial institution; the final objective is to build a new SCF entity which represents a single interface between all the players involved and also facilitates the engagement of new actors.
Moreover two different service providers, Oxygen Finance in the UK and Taulia in Germany, were taken in consideration; both are specialized on SCF for the SMEs, but their services and methodological processes are completely different.
Finally the last case study was based on Philips, which is developing an interesting new program of multi-tier SCF in order to involve all the strategic suppliers of the supply chain and to reach a more sustainable growth in the long period.
The following table (table 5.2) summaries the case studies of this work:

TREND	CASE STUDIES	COUNTRIES	INTERVIEWS
Governmental experiences	**Urica**: web-based electronic early payments platform funded by the British government and other investors. Solutions addressed to all SMEs suppliers, especially exporters, for which is possible to assess a rating. The discount rate fluctuates around the 2% of the invoice nominal value, depending on the rating and the early payment timing. No additional costs and risks fo the buyers.	**UK**	1) A board member of SCF community from Cranfield University. 2) Global Network Development Director of Urica. 3) Project manager of SCF for SMEs from the Dutch Ministry of Economic Affairs. 4) Managing director of Taulia Germany. 5) CEO of Oxigen Finance. 6) Philips´ employee in the Procurement Finance department, developing a thesis on SCF. 7) Philips´ employee in the Procurement Finance Departement focusing on the Multi-tier SCF project.
	National Health System: public SCF scheme in which the British government, thorugh the NHSBSA, plays the role of focal company in the community pharmacies´ supply chain. The suppliers are funded by CityBank with a convenient rate, based on the credit risk of the public authority (monthly 0,6% of the invoice nominal value). The program has no entry and exit costs and offers also the opportunity to get early payments up to a minimum of 7 days after the approval of invoices.	**UK**	
SCF for SMEs	**Promise-to-pay Engine**: Dutch project for an indipendent SCF finance entity in collaboration between the government, Windesheim university, financial institutions and focal companies. The aims of this entity are to sponsor SCF and spread its knowledge, to act as a single interface between the buyers and the suppliers, to facilitate the collection of funds and to function like a chamber of compensation in order to manage the financial flows in the best way. The main financial goal would be to unloack a volume of €5 billions within the end of 2018.	**Netherlands**	
	Taulia: technology provider for supplier financing, leader in USA,UK, and Germany. It offers SCF, Dynamic Discounting and a new solution combining the advantagies of the previous two. The buyers can fund these programs on their own or using the capability of third parties. The competitive advantages are the flexibility of the solutions, the availability also for the SMEs, the possibility to integrate the instruments in ERP systems of the firms and to syncronize in real time the platform, the possibility to define the discount rate through a bid-ask mechanism between buyers and suppliers.	**Germany**	
	Oxygen Finance: early payments technology platform helping buyers and public authorities to accelerate and automate suppliers' payments. The solutions are available for everybody and no investments are required since the provider is responsible for all the aspects of the project. No third parties are included, peer-to-peer solutions ad-hoc for the clients, Pay-for-performance model and efficiency improvements guaranteed.	**UK**	
Multi-tier SCF	**Philips**: Multi-tier SCF project in phase of development with the most strategic suppliers. The aim is to support these subjects in order to achieve a larger sustainability of the business in the long period and to enforce the relationships along all the supply chain. No additional costs or risks for the suppliers, significant investments for Philips and no benefits in the short period. Important screening of suppliers: direct relationship buyer-Tier2 suppliers, minimum of procurement expenditure, higher suppliers' interest rate, suppliers' liquidity problems. The solution involves a bank, which decides the interest rate within a pre-established range, spefic technology developed by the bank or a service provider.	**Netherlands**	

Table 5.2: case studies summary.

5.2 Limitations and future developments

SCF is a complex topic and, at the same time, a relatively new field of application; consequently there are still several steps to be completed and a lot of aspects to be studied in details, especially considering that the potential of these schemes is strongly affected by the economic and financial context, which is continuously evolving.

Moreover, the possibility to implement similar solutions depends on the particular features and conditions of the actors involved, which for definition are different from a country to another.

Therefore it could be useful to develop more detailed analysis focused on a single country, or a group of very similar countries, since there would be the possibility to obtain more specific implications and to reduce the risk of generalizing too much.

Another interesting consideration is about the terminology of SCF; since it is a recent topic, there is no a universally accepted vocabulary yet.

As studied in the literature analysis, there are a lot of different definitions of SCF and several interpretations of this term, which can be more or less wide; consequently, there are also different opinions about the solutions to include in this category and some different classifications.

In that view, in order to better clarify the concept of SCF and to clearly analyze its potential, it should be important to provide an official terminology about these schemes, universally shared and accepted at international level.

Finally, this work is mainly theoretical since its central focus is about the future developments of SCF; they are gaining interest in the most advanced countries and, as illustrated before, the more audacious players are developing interesting projects about that.

Of course, this is just the beginning and consequently there are no a lot of practical evidences or numerical indications; this is because the projects are expensive and in general the quantitative information are confidential.

Therefore, interesting future developments in this field of application could be addressed to realize more specific studies reporting quantitative evidences about the benefits and the investments necessary for the main players involved in SCF schemes.

Bibliography

Aberdeen Group, Supply chain finance: gaining control in the face of uncertainty, 2011.

Aberdeen Group, Technology platforms for supply chain finance, 2007.

Aberdeen Group, Working capital optimization: a cross-functional look, 2007.

ACCA, Innovations in access to finance for SMEs, 2014.

ACT, Supply chain finance: report of the supply chain finance working group, 2010.

Asad Ata et al., Financing SME supply chains, The SWIFT Institute, 2013.

D.Battini, A.Grassi, A.Persona, F.Sgarbossa, Consignment stock inventory policy: methodological framework and model, International J. of Production Research, 2008.

J.Boot, Inter-firm risk management and supply chain finance, Msc Thesis, Vrije Universiteit Amsterdam, 2014.

J.Boot, SCF 2.0 Research Philips, 2014.

F.Caniato, L.M.Gelsomino, D.Luzzini, A.Perego, S.Ronchi, A.Tumino, Supply chain finance – empirical evidence from multiple cases, Politecnico di Milano, 2014.

Eugenio Cavenaghi, Cross border issues regarding SCF, Barclays, 2013.

CBI the voice of business, Ripe for the picking: a guide to alternative sources of finance, 2013.

CGI Group, Supply chain finance: A new way for trade banks to strengthen customer relationships, 2007.

H.Cetinay et al., Value of reverse factoring in multi-stage supply chain, Michigan Ross School of Business, 2011.

T.Choi and S.Sethi, Innovative quick response program: A review, Int.J.Production Economics, 2010.

CIPFA Performance in public services, Oxygen finance limited–Early payment scheme, 2013.

City Bank, Day Lewis Group case study, August 2013.

Pamela Danese, Designing CPRFcollaborations: insights from seven case studies, International Journal of Operations and Production Management, Vol.27, N.2, 2007.

Deloitte, Financial supply chain management, 2013.

Demica Intelligently Working Capital, Building sustainable strength in German–Central European supply chains, Demica report series, Issue N. 20, 2013.

Demica Intelligently Working Capital, Strengthening the links, supply chain finance, Demica report series, Issue N.10, 2009.

K.Dencic-Mihajlov et al., Factoring as a financial alternative, Economics and Organization, Vol.8, N.4, 2011.

Department for Business Innovation and Skills, A User Guide to the recast Late Payment Directive, 2014.

Department for Business Innovation and Skills, Strengthening UK supply chains: good practices from industry and government, 2014.

R.Derrouiche, G.Neubert and A.Bouras, Supply chain management: a framework to characterize the collaborative strategies, Int.J.of Computer Integ. Manufacturing, 2008.

C. Dervojeda et al., Innovatice business model: supply chain finance, European Commission, 2014.

Deutsche Bank, SME financing in the Euro area, 2014.

Deutsche Bundesbank, The financial system, Monthly Report, October 2010.

Deutsche Bundesbank, The importance of trade credit for corporate financing in Germany–evidence from financial statements statistics, Monthly Report, October 2012.

Yan Dong, Martin Dresner and Yuliang Yao, Beyond information sharing: an empirical analysis of vendor-managed inventory, Production and Operation Management, 2013.

Dutch Institute for Advanced Logistics, Project Plan Supply Chain Finance 2.0, 2013.

Export-Import Bank of the United States, Supply chain finance guarantee program, 2012

Alea Fairchild, Intelligence matching: integrating efficiencies in the financial supply chain, Supply Chain Management: An international Journal, 2005.

Federal Ministry of Economic Affairs and Energy, The German Mittlestand: driving the economy Facts and figures about German SMEs, 2014.

Federal Ministry of Economics and Technology, Building on SMEs: greater responsibility – greater freedom, Public relations division/L2, 2011.

Charles Findlay, Reducing the risk and understanding movement of money through the tiers, Supply chain finance Community, 2014.

P.J.Garcia-Teruel, P.Martinez-Solano, A dynamic perspective on the determinants of account payables, Rev.Quant. Finan. Acc., 2010.

Luca Mattia Gelsomino, A model for the supply chain representation and financial assessment, Msc Thesis, Politecnico di Milano, 2012.

Giancarlo Giudici, Finanziare le risorse dell'impresa, Edizione Clup, 2010.

Global Business Intelligence Corp., Global supply chain finance first edition, 2007.

Global Business Intelligence Corp., Supply chain finance Payable and Receivable solutions guide, 2012.

Global Business Intelligence Corp., Working capital technology guide, 2013.

Global trade review, Accelerating supply chain finance, 2009.

Global trade review, Staying relevant in supply chain finance, 2009.

Moritz Leon Gomm, Supply chain finance: applying finance theory to supply chain management to enhance finance in supply chains, International Journal of Logistics Research and Applications, Vol.13, N.2, 2010.

K.Govindan, Vendor-managed inventory: a review based on dimension, International Journal of Production Research, Vol.51, N.13, 2013.

J.H.Hanf and Z.Pall, New dimension in retailing - retailer as a focal company, 4th Aspects and Visions of Applied Economics and Informatics, 2009.

M. Hariga et al., A vendor managed inventory model under contractual storage agreement, Computers and Operations Research, 2013.

W.R.Hartley-Urquhart, Supply chain financing system and method, U.S. Patent, 2000.

M.He, C.Ren, B.Shao, Q. Wang and D.Jong, Financial supply chain management, 2010.

M.He, C.Ren, Q. Wang and D.Jong, An innovative stochastic dynamic model to three stage supply chain finance, 2011.

M.Henke and A.Schulte, Supply chain finance: unlocking trapped liquidity in the supply chain, Fraunhofer IML.

Erik Hofmann and Herbert Kotzab, A supply chain-oriented approach of working capital management, Journal of business logistics, Vol.30, N.2, 2010.

Erik Hofmann, Inventory financing in supply chains: a logistic service provider-approach, International Journal of Physical Distribution and Logistics Management, Vol.39, N.9, 2009.

Erik Hofmann, Natural hedging as a risk prophylaxis and supplier financing instrument in automotive supply chain, Supply chain management: An international journal, 2009.

Erik Hofmann, Supply chain finance – some conceptual insights, 2005.

International Chamber of Commerce, A banking commission supply chain finance project, 2014.

Leora Klapper, The role of factoring for financing small and medium enterprises, Journal of Banking and Finance, 2006.

Leora Klapper and Douglas Randall, The impact of the financial crisis on supply-chain financing, Enterprise Note N.13, 2010.

Peter Kristofik et al., Financial supply chain management: challenges and obstacle, ACRN Journal of Entrepreneurship Perspectives, Vol.1, Issue 2, 2012.

La mia finanza, Soluzioni innovative per finanziare la piccola media impresa, 2014.

J.F.Lamoureux and T. Evans, Supply chain finance: a new means to support the competitiveness and resilience of global value chains, Social Science Research Network, 2011.

M3 Consultancy and Zanders, Without intervention, SMEs will not benefit from the growing supply chain financing options in the Netherlands in the short term, 2014.

J.Mentzer et al, Defining supply chain management, Journal of Business Logistics, Vol.22, N.2, 2001.

D.More and P.Basu, Challenges of supply chain finance, Business Process Management Journal, Vol.19, N.4, 2013.

C.L.Munson and M.J.Rosenblatt, Theories and realities of quantity discounts: an exploratory study, Production and Operation Management, Vol.7, N.4, 1998.

D.Naslund and S.Williamson, What is supply chain management? – A critical review of definitions, frameworks and terminology, Journal of Management Policy and Practice, Vol.11, N.4, 2010.

Navigant Consulting, Optimizing the U.S. Federal Government's supply chain(s), 2009.

Paystream Advisors, Dynamic discounting management: finding the treasure in treasury, 2012.

A. Persona, A. Grassi and M. Catena, Consignment stock of inventories in the presence of obsolescence, International Journal of Production Research, 2007.

Hans-Christian Pfohl and Moritz Gomm, Supply chain finance: optimizing financial flows in supply chains, Log. Res., 2009.

Philips, Corporate perspectives, 2013.

Politecnico di Milano, Supply chain finance: nuove opportunità di collaborazione nella filiera, 2014.

PricewaterhouseCoopers, Demystifying supply chain finance: insights into the what, why, how, where and who, 2009.

PrimeRevenue, Supply chain finance reaches the Netherlands: the next financing initiative unveiled, 2014.

PrimeRevenue, The missing link, 2013.

Usha Ramanathan, Performance of supply chain collaboration – a simulation study, Experts Systems with Applications: An international Journal, 2014.

W.S.Randall and M.T.Farris II, Supply chain financing: using cash-to-cash variables to strengthen the supply chain, International Journal of Physical Distribution and Logistics Management, Vol.39, N.8, 2009.

Regione Lombardia, Nuove misure di supporto al capitale circolante, 2012.

J.B.Rise, Achieving multi-tier supply chain coordination, 2002.

Sedex, Going deep: the case of multi-tier transparency, 2013.

Daniel Seifert, Ralf.W.Seifert, Margarita Protopappa-Sieke, A review of trade credit literature: opportunities for research in operations, European Journal of Operational Research, 2013.

Ralf.W.Seifert and Daniel Seifert, Financing the chain, International Commerce Review, Vol.10, N.1, 2011.

Ralf.W.Seifert and Daniel Seifert, Supply chain finance – what's it worth, IM International, 2009.

Andrea Sianesi, La gestione del sistema di produzione, Etas, 2011.

Ben.J.Sopranzetti, The economics of factoring accounts receivables, Journal of Economics and Business, 1998.

R.Sridharan and T.M.Simatupan, Managerial views of supply chain collaboration, Gadja Mada International Journal of Business, Vol.11, N.2, 2009.

Standard Chartered, Supply chain finance-Role of trade and investment policy, 2014.

Supply Chain Council, Supply Chain Operation Reference model, Version 10.0, 2010.

S.Templar, M.Cosse, E.Camerinelli and C. Finlay, An investigation into the current supply chain finance practices in business: A case study approach, Cranfield University School of Management, 2012.

The Paypers, E-invoicing, supply chain finance and e-billing market guide, 2014.

The White House, President Obama announces new partnership with the private sector to strengthen America's small businesses, 2014.

The White House, SupplierPay Pledge, 2014.

S.G.Timme and Erik Wanberg, How supply chain, Supply chain management review, 2011.

Giovanni Valentini and Lucio Zavanella, The consignment stock of inventories: industrial case and performance analysis, Int. J. Production Economics, 2003.

K.van der Vliet et al., Supply chain finance: research challenges ahead, 2013.

S.K.Vickery, J.Jayaram, C.Droge and R.Calantone, The effects of an integrating supply chain strategy on customer service and financial performances: an analysis of direct versus indirect relationships, Journal of Operation Management, 2003.

J.B.Weiss, How to better manage your financial supply chain, Qfinance, 2012.

Windesheim University, Kickstart Supply Chain Finance Pilot for Financing SMEs, 2014.

D.Wuttke, C.Blome, K.Foerstl and M.Henke, Managing the innovation adoption of supply chain finance – empirical evidence from six European case studies, Journal of Business Logistics, 2013.

D.Wuttke, C.Blome, M.Henke, Focusing the financial flows of supply chains: an empirical investigation of financial supply chain management, Int. J. Production Economics, 2013.

W.Yu et al., The effects of supply chain integration on customer satisfaction and financial performance: An organizational learning perspective, International Journal of Production Economics, 2013.

Citations from websites

Associazione Italiana per il Factoring, La Supply chain finance.
http://www.assinews.it/articolo.aspx?art_id=24266

Aztec Exchange, The global market place for trade receivables.
https://www.aztecexchange.com

Banca d'Italia, La relazione tra PMI e produzione industriale in Italia.
http://www.bancaditalia.it/pubblicazioni/temi-discussione/2011/2011-0820/index.html

City Bank, Pharmacy Earlier Payment Scheme.
http://www.citibank.com/transactionservices/home/supplier_finance/pharmacypayment/

City Bank, Supply chain finance scheme unlocks credit for community pharmacies.
http://www.citigroup.com/citi/citiforcities/healthcare/cs_United_Kingdom_pharmacy_earlier_payment_scheme.htm

Confartigianato, Workinvoice: una piattaforma per dare liquidita' alle imprese.
http://www.confartigianato-lombardia.it/it/confartigianato-varese-organizza-un-evento-a-ville-ponti-per-parlare-di-credit-crunch.aspx

Corriere Comunicazioni, Pagamenti: l'ICT salva i creditori.
http://www.corrierecomunicazioni.it/pa-digitale/26975_pagamenti-l-ict-salva-i-creditori.htm

Ecovadis, Sustainable monitoring in supply chains.
http://blogspot.ecovadis.com/2014/05/guest-post-sustainable-monitoring-in.html#!/2014/05/guest-post-sustainable-monitoring-in.html

EuroMoney, Supply chain finance presents an opportunity to SMEs.
http://www.euromoney.com/Article/3307260/Supply-chain-finance-presents-an-opportunity-to-SMEs.html

EuroMoney, Supply chain finance still viewed with caution among SMEs.
http://www.euromoney.com/Article/3209050/Supply-chain-finance-still-viewed-with-caution-among-SMEs.html

Finance Innovation, Paris financial services cluster.
http://www.finance-innovation.org/membres_en.htm

Gov.UK, Making it easier to set up and grow a business.
https://www.gov.uk/government/policies/making-it-easier-to-set-up-and-grow-a-business--6/supporting-pages/encouraging-private-sector-investment

Gov.UK, Prime Minister announces supply chain finance scheme.
https://www.gov.uk/government/news/prime-minister-announces-supply-chain-finance-scheme

ICC, Banking industry announces major undertaking to harmonize SCF terminology.
http://www.iccwbo.org/News/Articles/2014/Banking-industry-announces-major-undertaking-to-harmonize-Supply-Chain-Finance-terminology/

ICC, Uniform rules for Bank Payment Obligation.
http://www.iccwbo.org/About-ICC/Policy-Commissions/Banking/Task-forces/Bank-Payment-Obligation-%28BPO%29/

ICC Italia, Bank Payment Obligation.
www.iccitalia.org/pdf/bpo/pdf

M3 Consultancy, Supply chain finance unlikely for SMEs.
http://www.m3consultancy.nl/en/current-thinking-supply-chain-finance

Michael Quinn, A counterintuitive development: Supply chain finance in the new economic crisis, J.P. Morgan.
https://www.jpmorgan.com/tss/General/A_Counterintuitive_Development_Supply_Chain_Finance_in_the_New_Economic_/1275699773419

Nigel Taylor, Supply chain finance market growth.
http://www.gxsblogs.com/denise-oakley/2013/01/supply-chain-finance-market-growth.html

Oxygen Finance, The sustainable program for all buyers and suppliers.
http://www.oxygen-finance.com/

Pcubed, The future of software: an interview with Oxygen Finance's Mark Hoffman.
http://www.pcubed.com/bulletins/future-software-interview-oxygen-finances-mark-hoffman

Philips Annual Report 2012, Supplier indicators.
http://www.annualreport2012.philips.com/annual_report_2012/en/sustainability_statements/supplier_indicators.aspx

SayPartners, Researching Supply chain finance best practices.
http://ristretto.weave.eu/2014/10/08/researching-supply-chain-finance-best-practices/

SCF Community, Financial supply chain management-An opportunity for treasury.
https://www.scfcommunity.org/article/opportunity-treasury/#.VNIy-8nU4oM

SCF Community, Supply chain report: a new dimension.
https://www.scfcommunity.org/article/supply-chain-report-new-dimension

SEIS Window, Seed Enterprise Investment Scheme.
http://www.seiswindow.org.uk/

Taulia, Revolutionizing the way businesses interact.
http://www.taulia.com/de/

The Economist, Economies of scale and scope.
http://www.economist.com/node/12446567

The Telegraph, David Cameron heralds “win-win” finance scheme for business.
http://www.telegraph.co.uk/finance/newsbysector/industry/9626578/David-Cameron-heralds-win-win-finance-scheme-for-business.html

The White House, President Obama announces new partnership with the private sector to strengthen America’s small businesses; renews the Gov.’s Quick Payment initiative.
http://www.whitehouse.gov/the-press-office/2014/07/11/president-obama-announces-new-partnership-private-sector-strengthen-amer

Urica, Business on better terms.
https://urica.com/