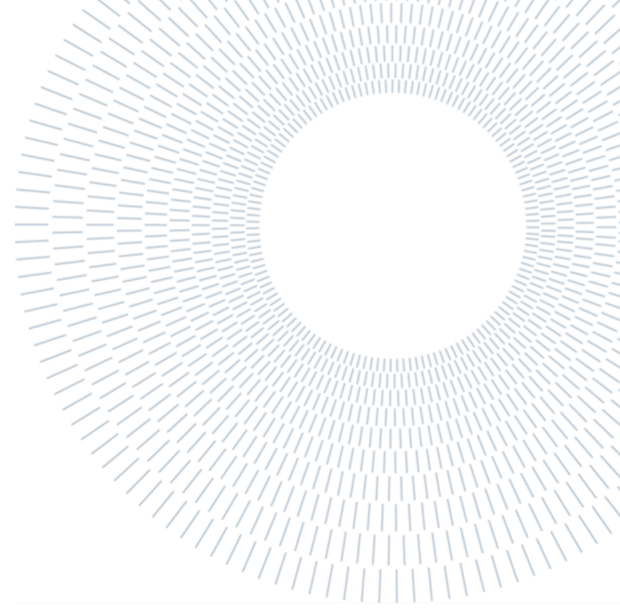




POLITECNICO
MILANO 1863

SCUOLA DI INGEGNERIA INDUSTRIALE
E DELL'INFORMAZIONE



EXECUTIVE SUMMARY OF THE THESIS

How can Supply Chain Finance foster supply chain sustainability?

MASTER OF SCIENCE DISSERTATION IN MANAGEMENT ENGINEERING

AUTHOR: ARIANNA CERETTI

ADVISOR: PROF. FEDERICO CANIATO

CO-ADVISOR: ING. ELISA MEDINA

ACADEMIC YEAR: 2020-2021

1. Introduction

Supply Chain Finance (SCF) is the set of solutions aiming at working capital optimization along supply chains, leveraging the relationships among the players in the chain (Gelsomino et al., 2016). Recently, increasing attention has been given to SCF solutions developed with a sustainable goal (Jia et al., 2020). In the current days, sustainability is emerging as a major theme in the business world, representing a core element in firms' strategic management (Hutchins and Sutherland, 2008). Focal companies urge to find ways to extend sustainability in their supply base, and sustainable SCF (SSCF) seems to be an effective tool to do so, both by providing suppliers with the needed liquidity to improve their living and production conditions (Caniato et al., 2016), and by providing financial rewards to suppliers according to their sustainable practices (Jia et al., 2016). However, few academics have focused on the topic, and SSCF still represents a great change as a research topic. Therefore, the aim of the presented dissertation is

to investigate whether SCF can promote sustainability, framing the concept of SSCF.

2. Literature Review

The analysis of existing literature started focusing on one side of the general SCF literature. Firstly, an overview of the main definitions, the background, the framework is provided, then scientific papers dealing with the main SCF solutions, technologies involved, costs and benefits, drivers, and barriers are analyzed. On the other side, the state-of-the-art of supply chain sustainability implementation has been assessed through the review of reports and papers regarding the general concept of sustainability, focusing on the TBL pillars, deepening supply chain sustainability and multi-tier sustainability, focusing that on ESG parameters, and finally, on the main drivers and barrier of sustainability field. Following these two preliminary analyses, the research focuses on the intersection point of these two fields, analyzing papers dealing with SC financing solutions that include the sustainability dimension.

3. Objectives

This approach to literature review allows to notice how the theoretical research and the real-life application of such topic is still under development. Several gaps have been identified in the existing literature: first, which are the SSCF solutions and which are their functioning schemes, the actors and technologies involved. Second, which are the drivers, barriers and expected benefits of SSCF solutions. To fill these gaps, the research questions guiding the dissertation have been formulated:

RQ1: Which are the drivers and barriers for the implementation of Supply Chain Finance programs to support sustainable development?

The first research aims to investigate the factors acting as drivers and barriers for the adoption of SSCF solutions.

RQ2: How do Supply Chain Finance solutions foster sustainability along the supply chains?

The focus of this research question is on the SSCF solutions. It focuses the attention on the functioning schemes of the solutions, on the actors involved, on the technology facilitating the management, and the interactions between these players.

RQ3: What are the expected benefits in terms of sustainability of sustainable Supply Chain Finance solutions?

The last research question aims at investigating the different expected benefits from SSCF solutions for the main involved actors. The preliminary research framework represents the structural illustration of the three research questions and of how they relate to each other and to the relevant variables identified from the literature review.

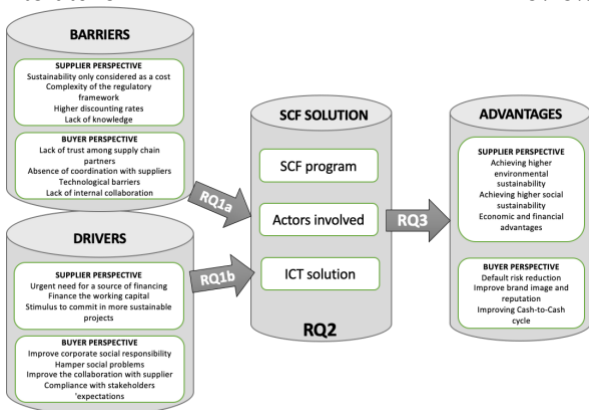


Figure 1: Preliminary Research Framework

4. Methodology

The methodology followed throughout the thesis is represented in figure 2.

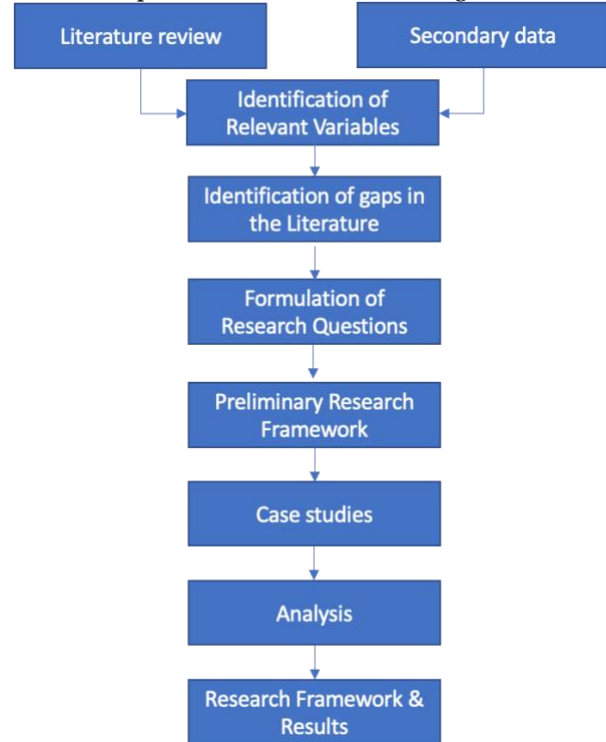


Figure 1: Research process's main steps

Firstly, the state-of-art of the existing literature is presented and at the same time, secondary data are gathered with the objective to collect real cases of application of SSCF programs. Combining the results of these phases, the relevant variables are identified, followed by the definition of the existing gaps in the literature, which should be addressed in order to provide a theoretical contribution to the existing literature. The gaps in the current state-of-art is the starting point to build up the three research questions, which will be constituting the building blocks of the preliminary research framework.

Then, multiple exploratory case studies have been conducted, following a semi-structured interview protocol. The unit of analysis is the SSCF solutions, and the sample is constituted by providers offering SSCF solutions and buyers adopting SSCF solutions. In the sample (table 1), both in operation and under development solutions have been considered, since also solutions that are still in preliminary phases are useful to collect the needed data for this research.

Firm	Type of actor	Contact Position	SCF
A	Financial Institution	Transaction Banking Director	RF
B	Buyer	Group procurement manager	DD
C	Financial Institution	Head of Working Capital Solutions, Continental Europe	C
D	Buyer	Head of Factoring and Working Capital solution	RF
E	Provider	Finance Manager	DD
F	Buyer	Global Director Treasury & Insurance	RF
G	Buyer	Chief Financial Officer & Head of Group Treasury and Corporate Finance.	RF
H	Buyer	EMEA Procurement Director Raw Materials	RF
I	Provider	Blended and Sustainable Finance	RF
J	Buyer	Purchasing Manager & Regional Treasury	RF
K	ESG info provider	Sustainable Principal Consultant	
L	ESG info provider	Account Manager	

Table 1: Main information regarding the interview company

The interviews have been analyzed following a within-case analysis approach, reconducting the respondent's answers to the building blocks of the research framework. Subsequently, the cross-case analysis has been constructed, by trying to build patterns, identifying similarities and discrepancies among the analyzed cases.

5. Results and discussion

RQ1: Which are the drivers and barriers for the implementation of Supply Chain Finance programs to support sustainable development?

The main drivers and barriers to SSCF adoption have been identified, considering the perspective of the buyer, the supplier, and the SCF provider, and distinguishing among primary and secondary drivers and barriers, according to their importance for the companies.

The primary barriers in the supplier perspective are:

- lack of knowledge: confirming what Khan, Yu, Golpira, Sharif in 2020 were stating in the literature, suppliers do not have the knowledge about the building infrastructure of an SSCF program;
- minimum threshold to access the program (new): to participate in the solution, the sustainable performance should overcome a certain threshold;
- fear of possible negative outcome of the evaluation(new): supplier prefers not to enter the program, instead of getting evaluated since this can lead to a negative effect on the vendor image.

Taking as reference the buyer, the primary barriers identified are:

- lack of knowledge: extending to the buyer the barrier encountered in the literature by Khan, Yu, Golpira, Sharif in 2020, customers lack competencies in the ecosystem and the potentialities of SSCF;
- need to persuade banks to participate (new): the buyer company often needs to convince banks to introduce the program;
- prerequisites already available in the company (new): starting from scratch the introduction of SSCF may be not possible, which means that some constituting elements should be already available in the company.

Beside the buyer and the supplier, also financial institutions recognize some primary barriers:

- lack of knowledge: outspreading to the bank the barrier encountered in the literature by Khan, Yu, Golpira, Sharif in 2020, a financial institution has not the knowledge about its roles in the program;
- technological barrier: as Ja, Zhang, Chen, (2019) are stating in the literature but shifting the perspective to the bank, it has difficulty in the process of parametrization and definition of technical requirements for the solution.
- monitor and check overtime the performance (new): a barrier is the lack of instruments to keep under control the sustainability performance to confirm or a;

Moving to the other composing element of the first research question, primary drivers from the supplier perspective are here listed:

- urgent need for a source of financing: aligned with what Liang, Zhao, Wang, Li (2018) are stating in the literature, a supplier, who is in need of capital, is pushed to enter the program and in some cases, is given priority to the ones more fragile, with a non-positive cash situation;
- finance the working capital: as Erbao & Man, 2019 are suggesting in the literature, suppliers may be driven to enter the program in order to cover their working capital requirements;
- financing condition related to the sustainability performance (new): according to their efforts in sustainable initiatives, suppliers can have better financing rates.

The secondary driver for the supplier is the stimulus to commit to more sustainable projects: Kang, Zhao, Mao, Li (2019) are explaining that suppliers are prone to invest in sustainable project and this is driving them to enter the program, as they can prove their commitment.

The buyer can encounter as primary driver:

- compliance with stakeholders' expectations: as stakeholders are more focused on sustainability, buyers try to be compliant with their requirements by acting in this direction: this is confirming what was previously identified in the literature by Cheng, Pok, in 2019.

A secondary driver is recognized from the customer side:

- improve the collaboration with suppliers (new): a solid relationship between the supplier and the bank can facilitate the introduction of SSCF.

The financial institution is facing a new driver: the collaboration with Fintechs which gives support in the programming phase.

RQ2: How do Supply Chain Finance solutions foster sustainability along the supply chains?

Through the analysis of the cases studies, four main functioning schemes have been derived. In the following presented solutions, the sustainable evaluation is usually performed with a yearly frequency. In Sustainable Dynamic Discounting, the ESG information provider assesses the sustainable

performances of suppliers using KPIs, dividing suppliers into clusters based on their sustainable effort, and inserts this information in the SCF platform. After the order and the invoice is issued, via the platform, the buyer anticipated the payment with a discount according to the cluster to which each supplier belongs.

The second solution is Environmentally Sustainable Confirming. The buyer, together with the financial institution, defines the assessing methodology. The ESG information provider evaluates the supplier. When a supplier delivers the order and issues the Invoice, the financial institution pays the supplier, applying an interest rate that is as low as the supplier is sustainable. At maturity date, the buyer is paying back the financial institution. Another player can be involved in Sustainable Confirming: a consultancy firm validates the sustainable assessment and the process of data collection. Sustainable Reverse Factoring involves, as first step, the ESG information provider who is assessing the sustainable aspects of the supplier. This first step, in some cases analyzed, is performed by the buyer itself. When the order and the Invoice are delivered, the supplier can ask the financial institution for advanced payment, which will be provided with an interest rate that is lower the more the supplier is sustainable. Finally, at due date, the buyer pays back the financial institution. The fourth solution is Sustainable Reverse Factoring with entrance barrier: the buyer is assessing the supplier involved, according to several parameters including sustainability. If the supplier does not overcome a certain threshold, it is not qualified for the program. Then, after the supplier sends the order and issues the invoice, the SCF provider gives the required financing to the supplier, taking into consideration the initial assessment for discounts. In conclusion, the buyer remunerates back the SCF provider.

Beside the buyer and the supplier company which are always present in the cases analyzed, some other players may be involved.

A sustainability rating provider can be involved in the definition of the evaluation methodology, and in the sustainable assessment of suppliers. Moreover, a validating entity can be included to certify the assessment processes and the sustainability of the SSCF solutions. The financial institution can be participating, by giving access to the financial capital and promoting

the SSCF program. Usually, these actors are supported by ICT technology, in order to implement the programs. Part of the companies interviewed is using proprietary platforms as supply chain management tools, already available before in the company management. While some other players are relying on Fintech or working capital solution providers.

RQ3: What are the expected benefits in terms of sustainability of sustainable Supply Chain Finance solutions?

As for drivers and barriers, also expected benefits have been considered according to the viewpoint of buyers, suppliers and SCF providers, and dividing them between primary and secondary benefits.

Looking at the supplier perspective, primary expected benefits are:

- economic and financial advantage: more convenient interest rates and financing conditions are the benefits expected by a supplier, in accordance with what is stated in the literature by Hofmann and Kotzab, in 2010, and even more when dealing with SSCF solutions that reward them for being sustainable;
- supplier development program (new): the suppliers can benefit from the support of the buyer company that can provide suppliers with resources, training and knowledge to improve their performances.

The secondary expected benefits of suppliers are:

- improving brand image and reputation: extending what Carter, Dresner (in 2001) have recognized as an advantage to the supplier, the vendor can have a positive effect on the brand empowerment and outside recognition for the sustainable effort;
- achieving higher environmental sustainability: the supplier has as benefit the improvement of its environmental impact, as stated in 2012 by Giunipero, Hooke, Denslow;
- achieving higher social sustainability: also, the social component of sustainability is boosting the supplier performance, in line with Brandenburg and other authors in 2014;
- becoming benchmark for other suppliers (new): the supplier is introducing an

innovative program, therefore is taken as a benchmark by competing companies;

- build competitive advantage (new): the supplier is leveraging on the fact that sustainability is a raising competing variable, and, in this dimension, it can distinguish itself from competitors.

From the buyer side, the interviews highlight the following primary expected benefits:

- improving brand image and reputation: as Carter, Dresner (in 2001) are explaining, by raising SC sustainability, the brand and image reputation is strengthened and associated to sustainability;
- achieving higher environmental sustainability: as in the vendor case, also the buyer can see benefits in the sustainability, especially in the sourcing and operations.

Secondary expected benefits for the customers are identified as:

- default risk reduction: a supplier that has a superior sustainability performance is associated with a lower risk for the buyer company, aligned to what is pointed out by the literature;
- achieving higher social sustainability: the explanation can be derived from the same benefit on the supplier side;
- improving Cash-to-Cash (C2C) cycle: Days of Payable outstanding are growing since the buyer in the program is usually lengthening the payment terms, overall resulting in a positive effect in the C2C, as presented in the literature by Jia, Zhang, Chen in 2019;
- validate the sustainability of SC (new): the buyer, by incentivizing the supplier to increase its sustainability, can see a positive effect on its supply chain, validating the sustainability in the overall chain;
- increase in volumes (new): suppliers can observe benefits in participating in the SSCF, therefore they are increasing their volumes involved in the solution.

In conclusion, the financial institution is also expecting benefits from the brand image and reputation perspective.

The case studies analysis led to the development of the final research framework (figure 3). In blue are reported the new variables introduced.

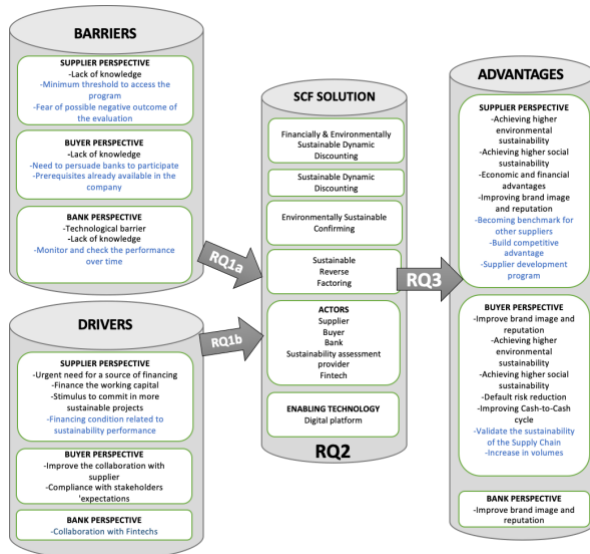


Figure 3: Final research framework

6. Conclusions

The dissertation aims at creating a link between SCF and sustainability. The thesis contributes to literature by introducing the SSCF solution functioning, the main actors and the technology involved. An important theoretical contribution is also related to drivers, barriers and expected benefits of SSCF. The findings of the thesis are relevant for literature since they are crucial to elaborate on the few papers that started to deal with SSCF as a general concept and framing the overall SSCF concept.

Moreover, the thesis can provide additional knowledge to business managers and companies. Indeed, the research helps in enriching the understanding of the mechanisms of SSCF solutions, the role of the actors and technologies, the drivers and barriers and the main expected benefits. The first limitation of the presented research is the limited number of companies interviewed; moreover, the perspective of the buyer, financial institution and sustainability assessment companies is taken directly into consideration, but the case-study lacks of direct insights coming from suppliers, and information regarding them is collected from interviews with buyers and SCF providers. Therefore, future research should consider in the sample also supplier companies, to directly grasp their point of view. In conclusion, since SSCF is a quite novel topic, being implemented in companies since the last decade, therefore, the quantitative benefits should also be subject of future researches.

References

- CARTER C.R., ROGERS D.S., 2008, A framework of sustainable supply chain management: moving toward new theory, *International Journal Physical Distribution Logistic Management*, 38 (5), 360-387.
- CHEN X., LI S., ZHAN J., 2018, The impact of financing mechanism on supply chain sustainability and efficiency, *Journal of Cleaner Production*, 205, 407-418.
- CHENG A., POK W., 2019, Corporate social responsibility and provision of trade credit, *Journal of Contemporary Accounting and Economics*, 15.
- ERBAO C., MAN Y., 2019, The bright side of carbon emission permits on supply chain financing and performance, *Omega*, 88, 24-39.
- GIUNIPERO L., HOOKER R. E., DENSLow D., 2012, Purchasing and supply management sustainability: Drivers and barriers, *Journal of Purchasing and Supply Management*, 18 (4), 258-269.
- HOFMANN E., 2005, Supply Chain Finance: some conceptual insights, *Logistik Management – Innovative*, 203–214.
- LIANG L., XIE J., ZHANG W., XIA Y., YANG J., 2018, The revenues of the cost sharing contract of pricing and service policy in a dual channel closed-loop chain, *Journal of Cleaner Production*, 191, 361-383.
- REHMAN KHAN S., YU Z., GOLPIRA H., SHARIF A., AMARDANI A., 2020, A state-of-the-art review and meta-analysis on sustainable supply chain management: Future research directions, *Journal of Cleaner Production*, 278.
- STEEMAN M., 2022, Driving sustainability through Supply Chain Finance reflections and insights, *SCF Community*.
- STEEMAN M., 2022, Supply Chain Finance in the era of E, S, and G, *Supply Chain Finance Community*.
- ZHAN J., LI S., CHEN X., 2018, The impact of financing mechanism on supply chain sustainability and efficiency, *Journal of Cleaner Production*, 205, 407-418.