A decision framework for inventory- and equipment-based Supply chain finance Solutions

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Abstract

Supply Chain Finance (SCF) has recently gained attention and relevance in both academia and practice. Indeed, during the pandemic crisis, firms in need for liquidity have increased the adoption of SCF solutions. Within SCF, a new stream of research is Asset-Based Lending (ABL), that encompasses inventory-based and equipment-based financing solutions. This study focuses on this topic by using a theoretical framework built on previous literature review and by adopting the theoretical lens of contingency theory. The case study methodology is adopted, with 25 observations collected by interviewing 15 providers and experts. For each of the 8 ABL solutions considered, it was possible to recognize contingent factors that favours the adoption, the objectives pursued by companies through their adoption and the stemming performance, in terms of benefits and costs. Moreover, ABL solutions were clustered in three typologies – *the pledged*, *the efficient* and *the leasing* – according to the objectives of adoption and the contingency factors. Six propositions and nine sub-propositions that explain the different typologies of adoption have been formulated. The typologies and the propositions can be used by managers as a guideline in the decision-making process, as they provide detailed information about the relevant variables to consider when adopting ABL solutions. Moreover, this study identifies future research directions, to assess the impact of each variable through quantitative methods from the adopter perspective, thus complementing our study.

Keywords: Supply Chain Finance; Asset-Based Lending; Contingency Theory

Full Reference

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Introduction

The fragmentation of supply chains and the recurring crises and disruptions have amplified the difficulty of managing global value chains. These events increased the attention of managers to focus not only on the management of the physical and information flows of a supply chain, already extensively investigated in academic literature, but also on the financial flows (Wuttke, et al., 2013; Jia et al., 2020). This attention reflected also in the scientific community, where a new field of study has emerged as relevant: Supply Chain Finance (SCF). SCF is defined as *"a mix of models, solutions, and services aiming to both optimise the financial performance and control working capital within a supply chain, exploiting a deep knowledge of supply chain relations and dynamics*" (Gelsomino et al., 2016, p. 1-2).

Academics in this field focus principally on two research streams: (i) the pure financial one, with debated themes such as credit rating and credit term optimization (Zhang, et al., 2015; Li, et al., 2019; Moretto, et al., 2019), or financial solutions focused on trade payables and receivables (Soufani, 2002; Klapper, 2005; Hofmann & Belin, 2011; Wuttke, et al., 2013; Van der Vliet, et al., 2015); (ii) the supply chain oriented one, aimed at studying the role of SCF in procurement processes, in buyer-supplier relationships (Hofmann, 2005; Pfohl & Gomm, 2009; Grosse-Ruyken, et al., 2011; Pellegrino, et al., 2019; van Bergen, et al., 2019; Martin & Hofmann, 2019), and supply-chain oriented solutions (Valentini & Zavanella, 2003; Lamoureux & Evans, 2011).

The concept of SCF has evolved during time and from the literature review provided by Gelsomino et al. (2016) it emerges how its boundaries have expanded: academics have started to focus not only on traditional solutions (e.g., Reverse Factoring or Dynamic Discounting), but they include also *inventory optimisation and/or inventory shifting solutions* and *fixed asset financing*. This is confirmed more recently by other authors that suggest to include also the financing of fixed-assets within the scope of SCF (Caniato et al., 2019). Indeed, also the management of fixed assets covers an important role in the evaluation of firms' performance (Gomm, 2010).

For these reasons, some authors are extending the SCF vision to the domain of assets and an important stream of literature, called Asset-Based Lending (ABL), is emerging (Berger & Udell, 2006; Buzacott & Zhang, 2004; Hofmann, 2009; Cornaggia et al., 2013). As explained by Buzacott and Zhang (2004, p. 2), *"in asset-based financing, a lender (usually a bank) loans money to a firm with the maximum amount of the loan linked to the firm's assets in the form of cash, inventory, and accounts receivable*". Unlike traditional loans, that tend to focus first on the amount of cash to be lent and then on finding an appropriate collateral, ABL focuses first

on the evaluation of the asset as a collateral, followed by the cash flow definition. Thus, the amount of credit offered is strictly linked to the value of the asset being pledged.

In the area of ABL, two main streams of literature are identified on the basis of the collateral taken into consideration, namely inventory (Buzacott & Zhang, 2004; Hofmann, 2009; Chen & Cai, 2011; Xu, et al., 2018) or fixed assets (Adams & Clarke, 1996; Berger & Udell, 2006). Including both inventory and equipment financing solutions from a supply chain finance perspective is quite innovative for asset-based lending: literature lacks a holistic perspective that comprises the difference among these types of solutions, as most of the studies focus only on one of the two.

But from a practical point of view, these solutions are often evaluated together, considering different collaterals on the basis of how companies address this requirement. More precisely, from a practical side, it is important for managers to have a clearer view about the different impacts that inventory and fixed-assets financing can have on operational and financial performance of a firm. Besides, complete decision models guiding firms in the choice of the most suitable ABL solution are still missing.

Only through a combined view of the two streams it is possible to build a model that considers all the relevant variables in choosing a specific solution. Among these variables, the objectives of adoption (i.e. a specific advantage the company wants to attain) should be included as their setting is the first step in selecting an ABL solution (Martin & Hofmann, 2015). It is also important to consider the real outcomes deriving from the adoption, in terms of both benefits and costs, considering that they can be shielded by some exogenous or endogenous factors (Donaldson, 2001). For this reason, ABL solutions need to be investigated using the contingency theory as theoretical lens.

On the basis of these gaps and consistently with the contingency theory approach, this paper aims at investigating the impact of contextual variables on the adoption of ABL solutions (i.e., response variable); moreover, the paper investigates the main performance of ABL solutions, in terms of costs and benefits.

Due to the exploratory nature of this paper, these objectives are conducted through in-depth interviews with 15 ABL providers. Through the empirical analysis, three different typologies explaining different ABL solutions were identified and analysed in terms of both contingent variables and performance.

The rest of the paper is organized as follows. At the beginning, the theoretical background of the paper is presented. Then, the main ABL solutions and the main contextual and performance variables investigated are described. The research methodology follows. Finally, the main

results are discussed and summarized in the main conclusions of the paper.

Contingency theory in Supply Chain Management

Contingency theory (CT) dates back to the 1960s, when Fiedler (1964) was among the firsts stating that a leader behaves and takes decisions according to contingent factors that determine his personality. This theory, initially individual-oriented, enabled many other contributions that started looking at its organizational application. Lawrence and Lorsch (1967) extended the scope of this theory, investigating the relationships between the way firms are organized and their economic performance. According to the authors, the organizational structure depends on the *"subenvironment each subsystem dealt with"* (i.e. the context) and significantly impacts the performance of a company. The environment started to be considered as a factor that affects the performance of a company. While other authors contributed to investigate the impact of contingent factors on the decision-making process (Vroom & Yetton, 1973). In general terms, contingency theory states that there is not a best way of managing an organisation and decisions have to be made following the aim of pursuing the most effective response according to the contingency variables. Sousa and Voss (2008) investigated the use of CT in Operations Management (OM) practices. They realized that some contextual variables are "field specific", e.g. the type of production process is specific of operations management. For this reason, their investigation focused on the application of the contingency approach on operations management practices. Specifically, this approach is called Operations Management Practice Contingency Research (OM PCR). As in contingency theory, also in OM PCR there are three types of variables: *contextual (or contingency) variables, response variables* (i.e. actions or practices taken to respond to contextual variables), *performance variables* (i.e. those measures used to check the fit between contextual variables and response variables). In OM PCR, operations management practices correspond to the response variables.

From the literature review only few studies embrace the contingency theory in the Supply Chain Finance field, such as the research by Martin and Hofmann (2019). As outlined by the authors, this can be a powerful theoretical lens to explore and examine different SCF practices by different companies, as their choices and results can depend form the context. Differently from their study, our research investigates particular types of solutions rarely considered in literature and barely explored under this theoretical perspective. Moreover, our study takes into consideration field specific contingency factors, i.e. they are peculiar to the ABL solutions. They were identified through a thorough literature review and provide another source of innovativeness as, at our knowledge, no previous work has ever considered them.

Following the OM PCR and the contribution provided by Sousa and Voss (2008), we aim to study ABL by considering the relationships between *contextual variables* (objectives and contingent factors) and *response variables* (the adoption of a specific ABL solution), investigating then the associated *performance variables* (benefits and costs stemming from ABL solutions' adoption). Thus, we aim to explain the choice of a specific solution given the relevant contingent factors and understand the performance of the implementation of each ABL solution.

ABL solutions

Analysing the extant literature, a common framework that helps to identify all ABL solutions was not found. Consistently with the insights of the literature review, the ABL solutions that have been taken into account are classified into two categories: inventory-based (Buzacott & Zhang, 2004; Hofmann, 2009; Chen & Cai, 2011) and equipment-based (Adams & Clarke, 1996; Berger & Udell, 2006) solutions. The first category refers to those solutions that have inventory as object of financing, while solutions belonging in the second group use fixed assets as collateral. In Table 1 the considered solutions are reported with their definitions.

Table 1: ABL solutions

Category of ABL solutions	Solution	Description	References
Inventory-Based	Inventory financing Traditional Model (IFTM)	Short-term loan provided by a financial institution, using inventory as collateral.	Chen and Cai (2011); Chen and Hu (2011); Hofmann (2009); Buzacott and Zhang (2004)
	Inventory financing Delegation Model (IFDM)	Short-term loan provided by a financial institution in which inventory is used as collateral and a logistics provider is entrusted to manage and monitor pledged goods on behalf of the financial provider.	Chen and Hu (2011); Chen and Cai (2011)
	Inventory financing Control Model (IFCM)	Inventory is financed by a Logistics Service Provider that buys goods from a manufacturer and obtains legal ownership before selling them to the manufacturers' customers.	Chen and Cai (2011); Chen and Hu (2011); Osservatorio SCF of Politecnico di Milano (2018); Hofmann (2009)

Equipment -Based	Equipment-based lending (EBL)	Loan in which an equipment (more generally a fixed asset) is used as collateral.	Bank of America Merrill Lynch (2014); Berger and Udell (2004)
	Operative Leasing (OL)	Method of financing equipment, machineries and real estate in which the lessor (the "lender") purchases the fixed assets and simultaneously enters into a rental contract with the lessee (the "borrower") that pays periodic fees and does not own the asset. At the end of the contract, the asset remains property of the lessor.	Berger and Udell (2004)
	Financial Leasing (FL)	Method of financing equipment, machineries and real estate in which the lessor (the "lender") purchases the fixed assets and simultaneously enters into a rental contract with the lessee (the "borrower") that pays periodic fees. The difference with operative leasing is that financial leasing generally implies a final purchase option for the lessee.	Berger and Udell (2004)
	Sale and leaseback (S&L)	Particular form of leasing through which firms leverage upon assets they already own to free up liquidity. The solution's adopter sells the assets first, and then enters in a leasing agreement for the same asset so that it can use it without owning it.	Adams and Clarks (1996); Ling (2012)

One existing gap about ABL solutions is the absence of a holistic perspective on ABL concept, especially with respect to the definition we assume. Many authors address ABL solutions separately focusing either on equipment-based (Berger and Udell, 2004) or inventory-based solutions (Buzacott and Zhang, 2004); those who deal with ABL in a broader sense, anyway include in the assets used as securities for the financing only current assets, namely inventory and receivables, neglecting noncurrent physical assets, and they tackle ABL just from a financial perspective, i.e. looking only at solutions in which a loan is granted and only the lessee and the lessor are involved in the solution. No one has elaborated yet a study presenting ABL as the set of solutions in which the collateral of the financing can be either inventory or equipment, and adopting a SCF perspective, i.e. looking at solutions in which a loan is granted and favoured by the typical relationships in the supply chain (buyer-supplier-financial provider-LSP, etc.) . Moreover, apart from Martin and Hofmann (2019), few studies have used a theory or an existing model to interpret findings. Table 2 sums up the literature that has been consulted for ABL solutions providing the perspective that authors have followed and if they have used

theories or existing models. As it may be noted, half of the studies have a finance-oriented perspective and use specific financial models, which are often not considered from the perspective of supply chain finance (e.g. Z-Score by Altman). Recent papers with a supply chain finance perspective have started using existing theories to investigate the topic (es. Wuttke et al., 2013a – Transaction Costs Economics; Wuttke et al., 2013b - Roger's model; Li et al., 2019 - Stackelberg game-theoretic model), but only Martin and Hofmann (2019) have used contingency theory to explore the field of Supply Chain Finance. Despite this, their work is not directly addressing ABL solutions. In the same way, many papers are finance focused and the ones that assume a supply chain finance perspective are projected towards a single Supply Chain Finance solution or to the general concept of Supply Chain Finance.

Table 2: literature consulted on ABL solutions and their perspectives.

Study	**Finance perspective**	**Supply chain finance perspective**	**Solution investigated**	**Theory or model used**
Buzacott and Zhang (2004)		x	Asset-based (inventory, receivables) financing	NO
Berger and Udell (2006)	x		General loan	NO
Durocher (2008)	x		Leasing	Imhoff et al.'s model (1991, 1997)
Hofmann (2009)		x	Inventory-based	NO
Gavazza (2010)	x		Leasing	NO
Gomm (2010)		x	SCF in general	EVA model
Chen and Cai (2011)		x	Inventory-based	NO
Chen and Hu (2011)		x	Inventory-based	NO
Rahu and Sufi (2011)	x		Leasing	NO
Ling (2012)	x		Sale and Leaseback	NO
Cornaggia et al. (2013)	x		Leasing	OBS lease liabilities (Oplease) model - Graham et al. (1998) Z-Score model - Altman(1968)
Schallheim et al. (2013)	x		Leasing	Z-Score model by Altman(1968)
Wuttke et al.a (2013)		x	SCF in general	Transaction Costs Economics (Coase, 1937; Williamson, 1981)

Wuttke et al.b (2013)		x	SCF in general	Innovation theory - Roger's model (2003)
Fitò et al. (2013)	x		Leasing	NO
Liu et al. (2015)		x	Inventory-based	NO
Song et al. (2016)		x	Inventory-based	NO
Bourjade et al. (2017)	x		Leasing	NO
Li et al. (2019)		x	SCF in general	Game theoretic approach - Stackelberg game-theoretic model (1934)
Martin and Hofmann (2019)		x	SCF in general	Contingency theory (CT) - Donaldson, 2001
Jia et al. (2020)		x	SCF in general	Information Processing Theory

Asset Based Lending solutions: objectives, contingent variables, costs and benefits

This section is divided in four paragraphs aimed at reporting the main variables emerged from the academic literature that impact on the decision of adopting ABL solutions. Consistently with the indications of contingency theory, first of all we considered contextual factors. As reported by Sousa and Voss (2008, p. 7), *"contextual variables represent situational characteristics usually exogenous to the focal organization or manager".* They are characterised by the difficulty of managing and manipulating them and organizations or managers are able to change them only in the long run. As contextual factors, we considered objectives of ABL solutions and contingent variables. Then we introduce the benefits and costs of ABL solutions' adoption.

Objectives of Asset-based lending

The first variable taken into consideration pertains to the main objective of an ABL solution. In fact, the first step in selecting an ABL solution is the objective definition. In order to select the best solution, companies need to specify these objectives and rank them on the basis of their relevance (Martin & Hofmann, 2015). Thus, objectives identification triggers the decisional process driving firms to adopt an ABL solution in terms of aims and purposes (Caniato, et al., 2016). The main objectives emerged from literature that lead a firm to adopt an ABL solution have been clustered into firm-focused and supply chain-focused objectives adopting the following criteria: the first ones are objectives leading a firm to adopt an ABL solution mainly

for its own interest (Bank of America Merrill Lynch, 2014; Bourjade, et al., 2017; Bradbury, 2003), while the second ones are those triggering the adoption of an ABL solution to gain a positive outcome for the whole supply chain or at least a part of it (Gomm, 2010; Hofmann & Kotzab, 2010).

Three firm-focused objectives have been identified and considered:

- Liquidity increase, referring to the need of liquidity that firms may have for several reasons (e.g. to sustain a project). From academic and managerial literature clearly emerges that increasing liquidity is what leads firms to look for a "pure ABL" solution. Specifically, firms ask for a credit line using inventory or equipment as collateral to generate liquidity and take advantage of the utilisation of their current or non-current assets (Buzacott & Zhang, 2004; Faulkender & Petersen, 2006; Gengzhong, 2007; Merrill Lynch, 2014; Chen & Hu, 2011; Schallheim, et al., 2013; Liu, et al., 2015);
- Flexibility, referring to the possibility to use an asset without owning it and to repossess the asset more easily at the end of the contract and reallocate the capacity at a lower cost. Flexibility is one of the objectives leading to the adoption of leasing, especially of Operative Leasing, since it allows the lessee to recover some flexibility when making its managerial decision (Gavazza, 2010; Bourjade et al., 2017);
- Asset derecognition: removal of an asset (or a portion thereof) from an entity's balance sheet (Bradbury, 2003). For instance, currently Operative Leasing allows firms to derecognize the leased goods that, consequently, do not appear in the balance sheet of the lessee but stay in the books of the lessor (Durocher, 2008; Fitó, et al., 2013; Cornaggia, et al., 2013)

In addition, three supply chain-focused objectives have been identified:

- Reduction of supply chain disruption risk, i.e. reduction of the risk of failure or bankruptcy of one or more players of the supply chain, with a subsequent effect on the other members (e.g. shortage of supply) (Wuttke, et al., 2013; Gelsomino et al., 2016; Martin and Hofmann, 2015);
- Reduction of supply chain cost of capital, i.e. the reduction of overall financial cost sustained by different actors of supply chain for financing their net operating working capital or fixed assets (Randall and Farris, 2009; Hofmann, 2009; Gomm, 2010; Martin and Hofmann, 2015);

- Minimization of supply chain cost of adoption, referring to the cost to adopt the considered solution.

Despite literature has quite clearly identified the main objectives, what is actually missing is the link between objectives and ABL solutions. More specifically, objectives of adoption of ABL solutions are presented with a holistic view, without a proper link between single objective and specific ABL solutions. On the basis of this gap, the first research question was formulated:

RQ1) How do supply chain and firm level objectives influence the choice of an ABL solution?

Contingent Factors

The second block of contextual variables concerns contingent factors, that can affect the adoption of an ABL solution once defined the primary objectives. Literature gives some insights into which are the contingent variables to consider when studying ABL and some insights about potential effect they have on solutions. In particular, five relevant contingent factors were identified:

- Balance sheet composition: the structure of the assets of a company. It depends on the amount of current assets, which include inventory, and non-current assets, composed by machinery, equipment, real estate, and intellectual property and their relative weight in the balance sheet. A firm tends to choose a solution employing either current or non-current assets according to its balance sheet composition (Rauh & Sufi, 2012; Merrill Lynch, 2014);
- Loan-to-value (LTV) ratio: the ratio between the amount of granted loan and the liquidation value of the borrowing base (Song, et al., 2016). The borrowing base is the combination of the assets the borrower can use to secure the ABL loan and their value (book value) (Buzacott and Zhang, 2004; Song, et al., 2016; Calomiris, et al., 2017). LTV is a ratio that depends on the level of risk tolerance of the bank (Li, et al., 2019);
- Marketability of underlying assets, i.e. the easiness of reselling goods in the market in case the borrower fails in fulfilling its obligations. It is crucial for those solutions in which the financier retains ownership of the asset at the end of the contract. It is important for inventory-based solutions to assess the financier's risk in case of debtor's default, while for leasing solutions it is a discriminating factor in the choice of who will

retain the ownership of the asset at the end of the contract (Gavazza, 2010; Hart & Moore, 1994);

- Visibility: the degree of visibility along the supply chain, i.e. the amount of information that a player in the supply chain possesses about other players (Pfohl and Gomm, 2009). In a condition of low visibility, the lack of information limits the willingness of providers to offer any solution (Pfohl and Gomm, 2009; More & Basu, 2013; de Goeij, et al., 2016);
- Legal system: it concerns the strength of the lending infrastructure for what concerns movable assets; in particular, it refers to the existence of laws that safeguard lenders for asset repossession (strength of contract enforcement laws) (Berger and Udell, 2006; Calomiris et al., 2017).

Contingent factors have been extensively identified in literature (Bank of America Merrill Lynch, 2014; Buzacott & Zhang, 2004; Gavazza, 2010). Even though many authors have addressed their research in studying what the possible factors could be, there is no clear understanding on how these variables affect the selection process. Therefore, understanding this point can be helpful for managers who need to orient themselves in the ABL solutions landscape to select the most suitable solution for their firms and their supply chains. On the basis of this gap, the second research question was formulated.

RQ2) How do contingent factors influence the choice of an ABL solution?

Benefits of ABL solutions

Part of the academic literature focused on understanding when a SCF solution is valuable. Many models, both quantitative and qualitative, have been used to analyse and quantify the potential benefits of a SCF programme in order to answer this question. The difficulties in this specific task are related to the fact that different solutions address different needs and solve different issues. As defined by Gelsomino et al. (2016), SCF is generally adopted to optimize the Net Operating Working Capital (NOWC) of a supply chain and this may be the main benefit of adopting a SCF solution. Nevertheless, from the literature review it came out that benefits are solutions specific (Lamoureux & Evans, 2011; Hofmann & Belin, 2011). Inventory-based solutions provides several benefits: Buzacott and Zhang (2004) have explained how these solutions can help to add further liquidity into a supply chain by taking decisions related to

operations. Moreover, also solutions' providers are better off by reducing the risks associated to the loan. Hofmann (2009) studied in detail an inventory financing model focusing on the advantages it brings to the adopter: according to the author it may bring additional revenues coming from the financing activities. Hence, there is a financial benefit in the short term due to the increase of liquidity, and an economic benefit that stems from the growth of revenues caused by the possibility to invest more financial resources. Lamoureux & Evans (2011) confirmed the financial advantages further explaining how these change according to the type of inventory finance solution adopted. It is more difficult, instead, to find benefits for leasing and sale and leaseback solutions. The most comprehensive and general model about SCF solutions' benefits is the one provided by Bonzani et al. (2018) that divides SCF benefits in four categories: financial, economic, operational and intangible. Financial benefits encompass NOWC improvement, better access to credit, lower cost of debt. Economic advantages come from the revenue increase and the Cost of Goods Sold (COGS) reduction. Operational benefits regard the efficiency increase and a better effectiveness along the chain. Finally, Supply Chain benefits are related to the enhancement of relationships among partners or improvement in sustainability. In this paper we decided to use this model since it regards SCF in general and it is not solution-specific. Thus, it seemed to be appropriate also for ABL solutions. Though, the positive effects of ABL solutions are still under explored and, particularly, finding the solution-specific benefits may be useful for adopters in the decision-making process. A relevant gap is also related to how these benefits are linked to the variables we are considering in our model.

Most of the literature about SCF mainly considers the account payables and receivables solutions, with less attention to ABL solutions. Although a review in this perspective has been carried out, a clear classification of benefits, as the one provided by Bonzani et al. (2018) for other supply chain finance solutions, is missing regarding ABL. Investigating benefits for each solution in a comparative way could be of further help for managers who have to decide which one to go for, even taking into account the impacts resulting for the firm and the supply chain from the selection of one alternative instead of another. On the basis of this gap, the third research question aims at understanding how different solutions drive different benefits:

RQ3) What benefits (i.e., financial, economic, operational, and supply chain oriented) do ABL solutions bring to companies?

Costs of ABL solutions

Contrary to benefits, in academic literature it is more difficult to find studies about SCF costs, and particularly about ABL solutions. Hoffman and Belin (2011) and Gelsomino et al. (2016) provided models that consider costs about traditional solutions such as Reverse Factoring and Dynamic Discounting. Specific studies that investigate the expenses of adopting an ABL solution were not found and it was decided to use the model by Bonzani et al. (2018) also to design the research framework about costs. In particular, costs have been clustered in planning, implementation and use costs. They conceptually follow all the phases of adoption of a SCF programme: the first phase refers to the spending due to the selection of the solution and the provider, including any costs related to consultancy. The second refers to all implementation activities, such as platform purchase, training, contract management and change management. The latter concerns the expenses due to the direct use of a solution, such as financial or management and control fees. Since ABL is a particular category of SCF solutions, we decided to use this model as it studies the adoption costs in general terms and not specifically for a single solution.

As reported, literature about costs is poor and most of the research is mainly focused on Reverse Factoring, with a paucity of contributions about ABL solutions. On the basis of this gap, the fourth research question aims at understanding how different solutions have different costs:

RQ4) What costs (i.e., planning, implementation, use costs) do ABL solutions bring to companies?

Research framework

To fill the abovementioned research gaps and answer research questions, a research framework was developed, as depicted in *Figure 1*. The framework has been conceptualized following the findings of the literature review and built on the basis of the formulated research questions. The specific variables of the framework are those identified in the literature review and reported in the specific paragraph.

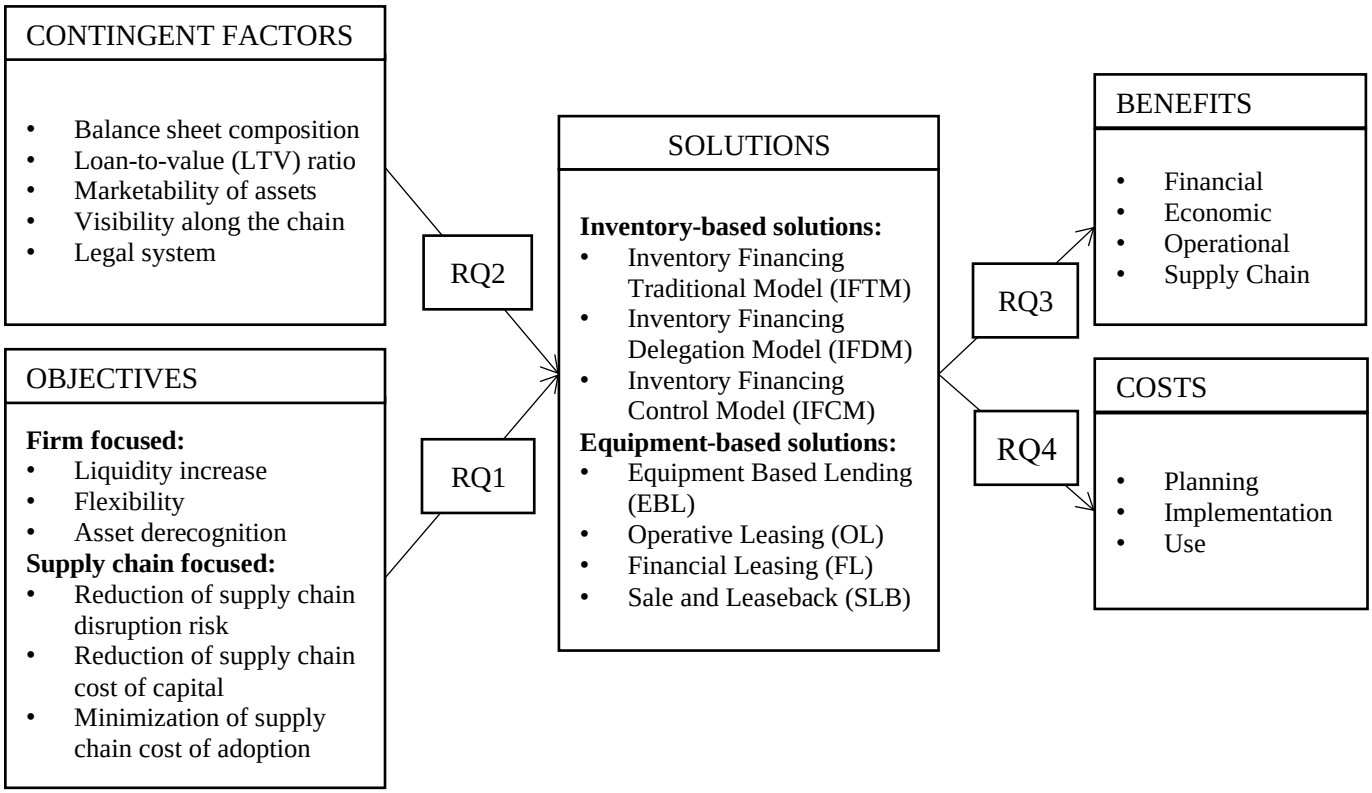

Figure 1: research framework

Methodology

Sample creation and description

Due to the exploratory nature of the research, case study methodology has been adopted as the most appropriate approach to follow to conduct this investigation. As defined by Yin (1984, p. 18) a case study is "*an empirical inquiry that investigates a contemporary phenomenon within its real-life context: when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used."* Additionally, as outlined by Yin (1984) and Eisenhardt (1989), the case study method is most appropriate in the early stages of studies about a managerial theory, when key variables and their relationships are still to be understood. Indeed, also other papers in SCF literature have adopted this methodology to develop new knowledge (Wuttke, et al., 2013a; Wuttke, et al., 2013b; Martin and Hofmann, 2015; Caniato, et al., 2016). Asset-Based Lending is not a new concept per se, but investigating ABL within Supply Chain Finance and adopting a contingency theory perspective constitutes a novelty in literature so far, as shown also in table 2 and in the related paragraph, and it deserves further analysis.

Contrary to the existing case study research identified in literature, in which the adopted perspective is the one of the buyer firm, our research embraces the solutions providers'

perspective. This choice is consistent with the indications provided by theory, as solutions' providers are among the main actors involved in the use of SCF solutions (Gomm, 2010). This approach is also consistent with previous studies in the SCF domain; indeed, the sample selection followed Moretto et al.'s study where providers were chosen as interviewees with the aim of leveraging the experience they gained by offering the same solution to many clients, thus having the possibility to collect their perspective about commonalities and differences among different users. Hence, sample selection criteria were set:

- Asset-based lending solutions' provider (players should offer at least one ABL solution)
- International players offering the same solution in more than one country.

The sample creation process started by a deep investigation on the common search engines by using keywords related to the ABL solutions that are investigated (es. "inventory financing", "inventory financing control model", inventory financing delegation model", "operative leasing", "financial leasing", etc.). It was possible to find different solutions' providers simply through this research. Then, by looking at their websites, it was possible to understand which ABL solutions they offer. Following indications of literature, pre-selected players should cover different solutions labelled as inventory-based or equipment-based solutions (e.g., Table 2). Players that satisfied the sample selection criteria were inserted in the sample. We managed to create a sample formed by heterogeneous players in terms of size, solutions offered and globalisation level, so that they could present their experience with different clients in different industries, thereby they could be considered representative. For each player, the right contact person was found by searching on the provider's website or on LinkedIn. When the email was available, an engagement email was sent, alternatively an engagement message was sent on LinkedIn.

The final sample, shown in *table 3*, consists of 15 informants: most of them are Financial Service Providers (FSP) (9 out of 15), but there are also 3 Logistics Service Provider (LSP) and a Technology Platform Provider. To ensure the comprehensiveness of the study, also an expert in the legal area and one advisor have been interviewed (F and N). Their inclusion was necessary as the interviews with logistics and financial service providers revealed some variables not emerged from the literature review, but relevant in practice (e.g *financial and economic situation of the firm*, *technology obsolescence*, *tax shield*). Nevertheless, they were not properly deepened from providers, so the sample was expanded with these two actors who could provide specific details concerning these variables. All the investigated solutions were covered: each solution was offered by at least one player in the sample. By doing this, it was possible to compare the adoption of ABL solutions from the point of view of multiple providers,

ensuring the replicability of results.

Data collection

The adopted unit of analysis is the asset-based lending solution, and each provider was interviewed for each ABL solution offered. In fact, as previously mentioned, each provider could offer more than one solution. In this case, information was collected separately for each solution.

The final sample includes 15 providers with a total of 25 observations, i.e. combinations of provider and solution (*Table 3*): 25 observations were considered an appropriate number to have 2 or 3 evidences for each solution, thus allowing a comparison of different approaches in different providers.

Each interview was conducted by at least 2 researchers of the team and recorded upon permission, with an interview length that ranged from a minimum of 30 to a maximum of 90 minutes. Interviews were performed in Italian language with Italian providers to avoid the risk of losing the meaning of certain words that are peculiar to Italian context (es. Italian legal system). By conducting the interview in informants' original language, the effectiveness of data collection was enhanced. The scripts of the interviews have been then translated in English to perform the data analyses, by carefully selecting English words that could have the same meaning of Italian words. Interviews with international providers instead were performed directly in English. A semi-structured interview protocol was developed: each question was linked to the variables of the framework and to the research questions in order to follow the research objectives. It is worth to mention that when the interview led to other interesting points in respect to the predetermined questions, some new questions were asked depending on the specific case. This flexibility allowed to identify new relevant variables that did not emerge from the literature. The interview protocol is provided as Appendix B.

Data collected through the interviews were triangulated with additional sources. In particular, a triangulation of information has been achieved by exploiting other secondary sources of data, such as reports and providers' websites, from which important information related to the single solutions were extracted, presentations of the solutions in events or workshops, documents provided by the company to clarify the solution. In case of doubts, in addition to direct interviews, e-mails were exchanged with the company, to complete the data. The explanation of the offered solutions on the providers' websites allowed to complete the set of information that were required to complete the analyses. For instance, information regarding benefits stemming from the adoption of ABL solutions were collected from the providers' websites and

reports. By doing this, it was possible not only to validate what the interviewees stated, but also to complete the data collection phase with missing information.

Table 3: list of informants.

Informant identifier	Type of provider/expert	Origin country	Explored ABL solutions
A	FSP	Italy	IFTM, EBL
B	FSP	Italy	IFDM, IFCM
C	FSP	Italy	IFDM
D	FSP	Netherlands	Operative and financial Leasing, Sale and Leaseback
E	FSP	USA	Operative Leasing, Financial Leasing
F	Legal Expert	Italy	IFTM
G	FSP	USA	IFTM, EBL
H	FSP	Canada	IFTM, IFDM, EBL
I	FSP	USA	IFTM, EBL
J	LSP	Italy	IFCM
K	LSP	Ireland	IFCM
L	LSP	Italy	IFDM
M	Platform Provider	Italy	IFDM
N	Advisory	Italy	IFCM
O	FSP	Italy	Financial Leasing

Data analysis

Data analyses were performed by following the case study methodology (Yin, 1984): firstly, a within-case analysis was performed, where each unit of analysis was analysed as a stand-alone entity in order to understand the relevant variables. Secondly, a cross-case analysis, reported in Appendix C, was carried out to compare answers about the same solution from different informants in different firms: all the relevant interviews have been compared across the considered variables to understand which factors were considered as most relevant by the informants. Since the relevant variables of the framework were already pointed out from literature, for both the analyses a deductive coding approach was followed, where the different

variables constituted the key elements of the coding tree. With the purpose not to limit the scope to the variables already taken into consideration in the literature, an investigation has been made to find new variables from the interviews also through an inductive coding approach: starting from the transcripts, we looked for "in vivo" codes or constructed new ones, then comparing such codes among different interviews and trying to find common patterns to turn into more aggregate concepts, with the purpose of identifying new variables. Appendix A shows the codes used for these analyses. Finally, data were triangulated with secondary sources, such as reports and providers' website. The outcome of cross-case analysis is reported in the tables inserted in the results paragraph and in Appendix C. Tables 5, 6 and 7 show the most relevant variables for each specific solution that emerged by comparing answers from different providers. In this phase, to reduce the degree of subjectivity embedded in the study, we exploited the fact of conducting the study as a team: two of us performed the within-case analysis and the cross-case analysis individually and a subsequent comparison and discussion of results led dialectically to the definition of a more robust outcome. At the end of the data analysis, new variables emerged from the interviews through an inductive coding approach and a final framework was created. Finally, three typologies of solutions' adoption have been identified, where each typology represents one or more ABL solutions' adoption pattern. A chain of evidence has been followed: the three typologies have been identified starting by the objectives of adoption. The starting point was the objective of liquidity increase since it is valid for each investigated solution. Two typologies were identified as this objective could be obtained either by accessing new liquidity or by preserving existing liquidity. By looking then at the other objectives and specific contingent factors, it was possible to obtain the third typology that is made of the only IFCM. Indeed, it was necessary to split it from the other solutions that belong to typology 1 as this solution is implemented with the aim of achieving other objectives (e.g. asset derecognition) and some contingency factors (e.g. marketability of the asset) play a different role in comparison to solutions belonging to typology 1. Benefits and costs are solutions specific, hence the ones that emerged from the analyses simply followed the clustering of solutions of the different typologies.

The methodological rigor of the process can be assessed considering the framework elaborated by Gibbert et al. (2008) based on the findings by Hyman (1982) and Yin (1984), that is applied to our case study as below:

Table 4: the methodological rigor of the research process - Gibbert et al. (2008) model.

Dimension	Description	Reference
Internal validity	The research framework is explicitly derived from literature and theory is triangulated using different bodies of literature (supply chain management, finance, supply chain finance). Results are matched and compared with the existing literature review.	See theoretical background, methodology and discussion chapters
Construct validity	Data triangulation has been achieved by using multiple sources of data (interviews, reports, website information, ...). The transcripts have been reviewed by peers and the data analyses have been explained and described. Cross-case tables have been provided.	See Appendix C (cross-case tables)
External validity	Cross case analyses have been conducted by interviewing different organization about the same solution. The fit between the case study selection and the Research Questions has been explained. Results have been presented to experts and to some of the interviewees in a workshop where they have been validated.	See table 3 (list of informants) and Appendix C (cross-case tables)
Reliability	The interview protocol has been provided. Results of the cross-case analysis have been provided.	See Appendix B (interview protocol) and Appendix C (cross-case tables)

Results

The cross-case analysis, shown in Appendix C, allowed to answer the research questions. The first outcome of the interviews is the detection of new variables that were added to the revised framework, and the exclusion of some of those emerged from the literature. Among solutions, it is important to point out that sale and leaseback (SLB) was divided in two solutions, as the leaseback phase can be managed in both operative leasing and financial leasing. The informant from company D informed us that it is better to consider these solutions as two different entities because there are discriminant variables to decide between a SLB – Operative leasing or with

a SLB – Financial leasing. For instance, in the first case, the company is not obliged to buy the assets; hence this type of solution is chosen when flexibility and/or asset derecognition are pursued as objectives of adoption.
Then, the cross-case analysis was used to investigate each variable of the framework and to answer the research questions.

First of all, the framework was revised in order to identify which are the objectives and the contingent factors relevant for the choice. This step allowed to eliminate some variables that emerged as relevant from the literature review but did not find application in the practice. Among contingent factors, the *loan-to-value ratio* emerged as not relevant as it is more related to the calculation of financial benefits: it is a percentage that represents the amount of the loan that the lender is willing to pay over the total value of the guaranteed asset. For this reason, it was excluded. Considering the adoption objectives, *minimization of supply chain cost of adoption* and *reduction of supply chain cost of capital* emerge to be weak or even not relevant in the adoption of the considered ABL solutions. None of the interviewees have cited them and, for this reason, they have been eliminated from the revised framework. Regarding costs, none of the informants mentioned *planning costs*: the reason can rely on the fact that the provider cannot have a perception of this types of expenses as they are related to the scouting of the proper solution and of the provider. Hence, the provider has not knowledge about these costs. For this reason, this cost item was excluded.
Beyond the exclusion, new variables emerged from the interviews and were added to the framework. Among objectives, two new variables were identified: *tax shield* and *inventory cost reduction*, that is specific to the Inventory Financing Control Model. It was possible also to identify 3 new contingent factors: *technology obsolescence, economic and financial situation of the firm* and *combination of physical assets and receivables*. The new variables will be explained in detail in the following paragraphs.

The objectives of ABL solutions (RQ1)
RQ1 aimed at understanding why companies decide to adopt a specific ABL solution.
First of all, the objective cited by all the informants as the most relevant one is the increase of liquidity. The interviews revealed that this objective can be split in two: **access to new liquidity** and **preservation of existing liquidity**. Indeed, liquidity can be obtained either by pledging goods and obtaining loans (IFTM, IFDM, IFCM, EBL) or by using an asset without owning it

(FL, OL). In case of SLB (OL) and SLB (FL) assets are first sold to the financial service provider, then leased back. It allows to both obtain new finance and preserve existing liquidity. Another common objective between multiple solutions is **asset derecognition**, typical of IFCM and OL. In IFCM, inventories are sold to a third-party player (typically a Logistics Service Provider) and this implies the derecognition of the asset from the balance sheet, with the consequence to reduce also inventory holding costs (new objective that emerged from the interviews). In the operative leasing case, the company can use the equipment without owning it and this implies that the asset will not appear in the financial statement. Regarding this, the interviewee D stated that all the solutions provided to clients were *"all structured leasing solutions to get an off-balance sheet treatment"*. This leads to a greater flexibility of the company. **Flexibility** is a key objective in OL: firms decide to adopt it also to have a higher flexibility in managing the assets. Indeed, informant D stated that often companies opt for this solution since they can use equipment without owning it. Interviewee E added that OL allows to easily end or lengthen the contract, with the possibility to have a technological upgrade of the equipment. This increases the flexible management of these assets. Another aim sought by companies through leasing solutions is the **mitigation of supply chain disruption risk**: informant D states that leasing can be selected to have a machinery that is necessary in order to grant the continuity of activities in a specific stage of the value chain: *"For example, once the cornfield is ready to be harvested there is no time to waste; so, if a farmer needs a harvester, he needs it at that moment, because otherwise he loses the harvest."* Thus, leasing is chosen as a flexible way to have the equipment when needed and without the risk to stop the continuity of activities.

Tax shield, i.e. the presence of a legal frame the implies fiscal incentives associated to leasing solutions, came out to be another important variable for leasing solutions since it pushes companies towards the adoption of OL and FL for the possibility to deduct the interest rate. The interviewee E stated about this: *"the tax incentives is certainly the first driver that guides the adoption of a leasing solution"*.

Finally, **Inventory costs reduction** emerged to be strongly relevant in inventory finance control model since inventories are sold to a third-party player that will act as an intermediary between the supplier and the buyer, owning the asset. Informant J declared about this: *"the main reason (of IFCM adoption) is cost reduction. What we do for a typical customer has little impact, so it's more of a cost item than anything else".* Therefore, the operating costs of holding and managing the inventories will be reduced for the adopting company.

Table 5: objectives of ABL solutions

		IFTM	IFDM	IFCM	EBL	OL	FL	SLB (OL)	SLB (FL)
Objectives (RQ1)	**Access Liquidity**	Get financing, financial constraint, growth	Get financing, financial constraint	Get financing By: selling inventory	Get financing, cannot get credit otherwise			Reduce liquidity disbursement, financing other debts	Get financing, reduce liquidity disbursement, financing other debts
	Preserve Liquidity					Reduce liquidity disbursement	Reduce liquidity disbursement		
	Asset Derecognition			Improving balance sheet position		Improving balance sheet position		Improving balance sheet position, supporting investments	
	Flexibility					Flexible management of assets		Flexible management of assets	
	Reduction of supply chain disruption risk					Granting continuity of activities along the chain	Granting continuity of activities along the chain		
New Objectives (RQ1)	**Tax Shield**					Reducing tax expenses by deducting interest rate	Reducing tax expenses by partially deducting interest rate		
	Inventory cost reduction			Reducing inventory costs by selling Inventories					

Table 6: contingent factors of ABL solutions (in brackets contingent factors mentioned by a single provider).

		IFTM	IFDM	IFCM	EBL	OL	FL	SLB (OL)	SLB (FL)
Contingent factors (RQ2)	**Balance Sheet Composition**	High quantity of Inventory: necessary condition			Large amount of equipment: necessary condition				
	Marketability	Influence factors: presence and type of distribution channel, characteristics of inventory	Influence factors: presence and type of distribution channel, characteristics of inventory	Influence factors: presence and type of distribution channel, characteristics of inventory	(Influence factors: characteristics of equipment (high market value))	Influence factors: presence and type of distribution channel, characteristics of equipment	Influence factors: characteristics of equipment		Influence factors: characteristics of equipment
	Visibility/ Digitalisation	Visibility on inventory data, inventory status through IT system	Visibility on inventory data, inventory status through IT system, tracking and tracing system	Visibility on inventory quantity, inventory status through IT system, tracking and tracing system	(Method: digital registry of equipment identification codes)				
	Legal System	Presence of a registry of security interests, non-possessory pledge law	Presence of a registry of security interests, non-possessory pledge law	Derecognition through ownership shift to the LSP	Presence of a registry of security interests	Presence of fiscal incentives		Agreement of forfeiture (it. patto commissorio) Importance: necessary	Agreement of forfeiture (it. patto commissorio) Importance: necessary
New contingent factors (RQ2)	**Combination of physical assets and receivables**	Inventory and receivables Importance: necessary	(Inventory and receivables Importance: necessary)		Equipment, receivables and inventory Importance: necessary				
	Financial & Economic situation of the firm	(Revenues)		(Financial stability)		Financial stability Importance: necessary	Financial stability, operative assessment of customer's performance	What: purpose of liquidity needs, solvency situation, customer creditworthiness	What: purpose of liquidity needs, solvency situation, customer creditworthiness
	Technological obsolescence					Equipment obsolescence level Importance: influence the choice between OL and FL	Equipment obsolescence level Importance: influence the choice between OL and FL	Equipment obsolescence level Importance: influence the choice between SLB(OL) and SLB(FL)	Equipment obsolescence level Importance: influence the choice between SLB(OL) and SLB(FL)

The contingent factors of ABL solutions (RQ2)

The contingent factors represent the contextual variables, related to the company adopting a specific ABL solution, affecting the choice.

There are several contingent factors that emerged to play a decisive role for many solutions. **Balance sheet composition** is relevant for IFTM and EBL as qualifiers. In particular a provider stated: *"Asset based lenders look at existing collateral a company have within the business: account receivables, inventory, equipment and real estate, and assess the value of such collaterals as part of the decision-making process on whether a company can qualify for a loan or not"*. The **marketability** of the collateral came out to be a necessary condition for the implementation of the solution: in particular, the existence of a marketing channel and the characteristics of the pledged goods are necessary conditions for the adoption of IFTM, IFDM, EBL and leasing solutions. Essentially, high marketability is a facilitator for the solutions that imply asset pledging. Interviewee F, talking about IFTM said: *"if the company is unable to repay the debt, investors will have at their disposal products that have a certain marketability. This is important for this type of financing, especially when it [the product] is pledged"*. Informant N added that products pledged are *"goods which have a sufficiently defined market, a sufficiently defined saleability and the time needed to sell them is foreseeable*". For instance, if the inventory consists of standard raw materials or standard finished products, generally they have broad markets where they can be sold in case of insolvency and a clear value, in comparison to customized finished products or specialized intermediate products that are much more difficult to resell. Consequently, the risk is reduced, and providers are more willing to offer the solution. For some solutions the lending is not only based on the marketability of the goods, but the lender takes into consideration also the financial and economic situation of the firm. Informant K mentioned that *"credit check could be the first thing. Make sure that the customer is enough financially stable.* […] *The customer needs to be financially stable, he needs to have reasonably strong demand for that product"*. Interviews showed that the assessment of the goods is more relevant compared to that of the firm for what concerns "pure" ABL solutions (IFTM, IFDM, EBL), confirming what already stated in literature. However, for the other solutions this does not hold true and the assessment of the financial and economic soundness of the client acquires importance. In two solutions (IFTM and EBL) providers take into account also the combination of physical assets and receivables in the balance sheet as a way to reduce the risk associated to the financing and enable the operation. Interviewee G said about this: *"There has to be account receivables, it is not possible to lend only against inventory"*. The only solution that potentially does not have high requirements both in terms of

marketability of the goods and financial and economic situation of the firm is IFCM, when there is a commitment by the customer to buy the inventory. Another relevant factor is the **legal system**, that is important for all the investigated solutions. However, the reasons behind the strong presence of this variable are multiple: for inventory-based solutions and equipment-based lending, the presence of a registry of security interests and the presence of a law concerning the non-possessory pledge is a necessary condition. Interviewee C stated explicitly *"the register, together with the non-possessory pledge, facilitates this type of financing"*. Instead, for leasing and SLB solutions, the presence of laws concerning fiscal incentives and agreement of forfeiture may enable the adoption process. This is the only case of presence of a national contingent factor as this is related to the Italian regulatory system. As stated by informant D: "*Operative leasing becomes of lower interest if you want to have tax incentives such as super depreciation and amortization for technological assets*". As mentioned before, this is strongly linked to one of the objectives of leasing solutions that is the decrease of tax expenses by partially or fully deducting interest rates. Finally, a factor that needs to be emphasized is the **visibility**, achieved **through digitalization**, which seems to play a fundamental role in the inventory-based solution. Through IT and tracking and tracing systems, providers want to monitor the status of the inventory in order to reduce the risk associated with funding. Words by interviewee H explain the type of visibility required on assets and the importance of digitization: *"We will only finance retailers who have robust systems. They have to use barcode scanning and a proper system. […] for normal inventory once a week we ask them to give us a certificate, monthly we might ask a certificate but with a print-out or a bigger break down like by age and stuff. [...] Retailers system has to be sophisticated enough"*. Among new variables, **economic and financial situation of the firm** was added as it is assessed by providers to define the eligibility for the adoption. It is especially important in leasing solutions as, before granting the use of the asset to the adopter, a financial and economic evaluation is needed. Its creditworthiness is checked and also an operative assessment of customer's performance is necessary. While this analysis is compulsory in leasing solutions, it is not always required for inventory ones. Another relevant variable is the **combination of physical assets and receivables**, that has an impact only on ABL solutions where the collateral is the object of financing (IFTM, IFDM, EBL). The presence of other current assets, such as trade receivables in the adopter's balance sheet, determines the eligibility for the financing. It is important especially in IFTM and EBL to mitigate the lender's risk. Finally, **technology obsolescence**, that affects only Leasing solutions (OL and FL), emerged as particularly relevant as a discriminant variable since the decision about the typology of leasing relies on this aspect.

Informant D indicated that *"goods that have a value over time tend to be financed by a financial lease, goods that tend to be highly obsolescent tend to be financed by an operating lease".* When the equipment, which is the subject of the leasing contract, is characterised by a high risk of technology obsolescence, preference is given to an operative leasing because it is possible over time to change the equipment with more updated versions and the adopter is not forced to purchase it at the end of the contract, as in the case of a financial leasing.

The benefits of ABL solutions (RQ3)

The cross-case analysis was also used to identify the main benefits of ABL solutions achievable by the company adopting the solution, as summarized in Table 7.

Interviews confirm what emerged from the academic literature about the strong relevance of **financial benefits**: interviewees stated that the main positive effect was related to an increase of cash flow. For instance, informant B stated: *"(the client) accesses a source of financing and therefore makes a fixed part of its balance sheet liquid even if it is short-term, which they did not have before; therefore, in my opinion, the availability of finance increases".* Companies achieve financing by pledging (IFTM, IFDM and EBL), selling (IFCM, SLB (OL), SLB (FL)) or leasing assets (OL, FL, SLB (OL), SLB(FL)). In particular, by pledging inventories it is possible to obtain a financing equal to a loan-to-value ratio (LTV) that ranges between 50 and 100% for IFTM and between 50-90% for IFDM. Instead, when an equipment is the collateral of the financing agreement, the LTV ratio decreases and the maximum achievable is 65-75%. Alternatively, if assets are sold to a third party (IFCM, SLB (OL)), beyond the capital gain, the other benefit is to obtain an off-balance sheet financing that allows to optimise cash flow and, in case the asset consists of inventories, improving the working capital position. Interviewee N confirmed that *"on the producer side it seems to me that the only advantage of the operation is to lighten the balance sheet and investors decide to reward it by raising the value of the shares".* Instead, informant J underlined that it is an achievable benefit but it is not the most pursued one: *"the asset derecognition from the balance sheet is one of the effects but not the main thing. A customer might ask us to do it and if we consider it economically convenient, we might decide to do it, but it is not the common practice".* The leasing options have another important financial benefit: tax expenses reduction. In fact, under the legal system of some countries (e.g. in the Italian one), the interest rates paid by the lessee may be partially or fully deducted by tax expenses. The benefit is achieved by the exploitation of this deduction under a time window that is much shorter if compared to the depreciation time window (in case of direct purchase of

the asset). This makes the deductible amount higher than the depreciation of the direct purchase, decreasing the taxable amount.

Economic benefits emerged as relevant only for IFTM and IFDM and Sales and Leaseback solutions. In inventory-based solutions this benefit seems to assume low importance: only one provider stated that economic benefits can be achieved by an increase in the revenues through a revolving pledge. It is important to mention that inventory-based solutions also imply operational improvements in the **effectiveness and efficiency of the company**. The effectiveness is due by the possibility to get financing over inventories, but retaining them in the warehouse, i.e. pledging without dispossession, especially in IFTM and IFDM. This allows to continue production processes without depriving stocks and having at disposal higher amount of liquidity to better run the operations. Regarding the efficiency, IFDM allows also to reduce inventory management costs as, in this solution, the pledged inventories are monitored and managed by a logistics service provider. Hence, the company can obtain savings in managing and holding stocks. While in IFCM, where inventories are sold to a third-party player, the achievement of efficiency is due to savings in inventory fixed costs such as labour, storage and management costs. Finally, some solutions imply benefits that go beyond the firm as a single entity, but affect also other supply chain players. One of the positive effects induced by IFTM is a better relationship among players, as stated by informant A: *"in terms of benefits, there is the consolidation of relations with other players in the supply chain".* Moreover, in IFDM a positive impact is related to the capability to stabilise the supply base from a financial point of view, mitigating the risk of a supply chain disruption, as explained by the interviewee from company F. In leasing solutions, supply chain benefits are gained by the supplier (vendor) of the machine/equipment that is leased. Informant from company D states: *"if you lease with us, you involve a third party, the vendor, who sells the machinery to us and immediately receives payment in full for the future cash flows that would have entered, plus has outsourced the risk".*

The costs of ABL solutions (RQ4)

Finally, the cross-case analysis was also used to identify the main costs of ABL solutions achievable by the company adopting the solution, as summarized in Table 7.

Concerning **implementation costs**, inventory-based solutions and EBL involve two types of expenses: the appraisal cost, to determine the orderly liquidation value (OLV) of the assets pledged against the debt, i.e. the estimate of the asset's value in case of a liquidation sale; the cost for the IT system set-up and integration. These last costs are due to the implementation of

systems needed for monitoring and providing visibility on inventory data, status and movement of assets. It is often a compulsory requirement for the solutions' adoption. However, it has been reported that these expenditures have a low relevance in comparison to the financial ones. In fact, informant H stated: *"There is the need for the implementation of a platform to provide information […] We don't have exorbitant costs"*. For leasing and, especially, for SLB solutions setup costs are relevant. These costs are borne by the lessee and include administration, information exchange and investigation costs. Moreover, it has also to pay an upfront instalment whose amount is the 10%- 15% of the leasing value, as stated by informant D. Results about **utilisation costs** are, instead, quite aligned for all the investigated solutions: the main expense is financial and concerns the interest rate to pay to the provider. It is confirmed by interviewee by company I about IFTM: *"The primary cost is the interest rate".* Informant H also stated that the interest rate *"can range from 12 to 16%*". For inventory-based solutions and equipment-based lending, the interest rate is related to the financing options and depends also on the assessment of risks. While for leasing solutions, companies pay a monthly/quarterly fee to the provider. IF control model is characterized by another utilisation cost that is the mark-up: the cost of the solution is a mark-up over the selling price for the provided service (inventory holding, insurance, financial cost), as explained by interviewee from company N. Informant from company J adds that *"this mark-up is full inclusive and ranges from 7% to 20%".*

Table 7: benefits and costs of ABL solutions (in brackets variables mentioned by one single provider).

		IFTM	IFDM	IFCM	EBL	OL	FL	SLB (OL)	SLB (FL)
Benefits (RQ3)	**Financial**	Increase cash flow by pledging goods LTV = 50-100%	Increase cash flow by pledging goods LTV = 50-90%	Off-balance sheet financing, improvement of financial indicators	Increase cash flow by pledging goods LTV = 65-75%	Tax expenses reduction, off-balance sheet financing, cash flow optimisation	Tax expenses reduction, cash flow optimisation	Cash flow optimisation, off-balance sheet financing	Cash flow optimisation
	Economic	(Increase turnover)	(Increase turnover)					Increase turnover (capital gain), profit improvement	Increase turnover (capital gain), profit improvement
	Operational	Incease effectiveness	Increase effectiveness: retaining inventory in the warehouse	Increase efficiency: reducing inventory management cost		Increase efficiency	(Increase efficiency: lower purchasing cost)		
	Supply Chain	Relationships enhancement and lower SC disruption risk		Supplier faster turnover		(Supplier faster turnover, supplier risk reduction)	Supplier faster turnover, supplier risk reduction		
Costs (RQ4)	**Implementation**	IT systems, appraisal cost	IT system, setup fee	IT system	Appraisal cost, IT system		(Set-up)	Setup fee, upfront payment	Setup fee, upfront payment
	Utilisation	Financial interest rate	Financial interest rate	Financial interest rate, mark-up	Financial interest rate	Periodic fee / instalment	Periodic fee / instalment	Periodic fee / instalment	Periodic fee / instalment

Discussion

As reported above, the previous results allow first of all to present a revised version of the framework, as summarized in *Figure 2*.

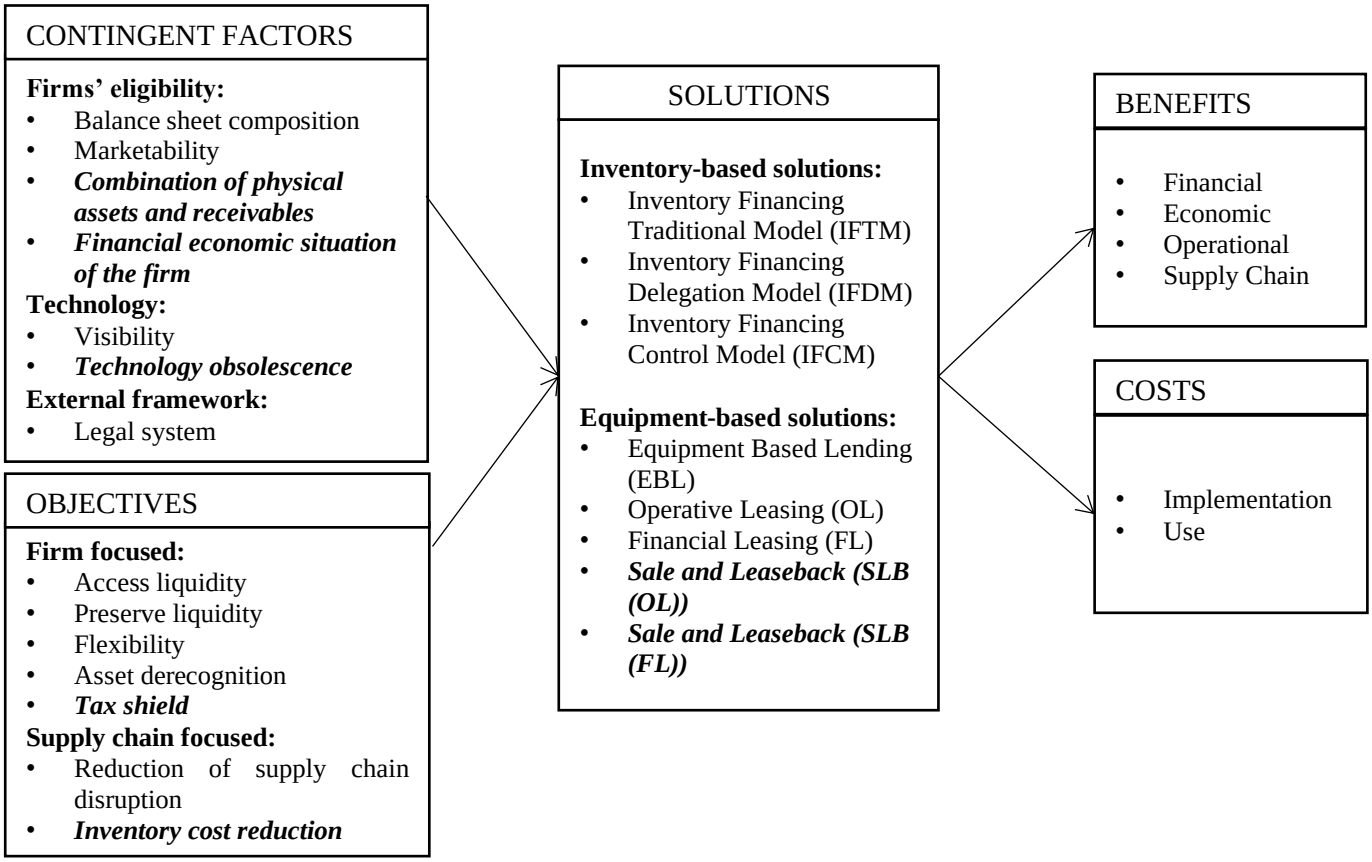

Figure 2: the revised framework.

On the basis of the abovementioned results and by looking at the common variables linked to the adoption of solutions (i.e., objectives and contingent factors), three different typologies of adoption that group together different solutions have been identified. A chain of evidence has been followed to distinguish the three typologies: the objective of liquidity increase is the first discriminant factor in deciding a specific solution. It may be obtained either by accessing new liquidity (typology 1 and typology 2) or by preserving existing liquidity (typology 3). As explained in the methodology chapter, by looking at the other objectives of adoption and at the specific contingent factors, it was then possible to divide solutions belonging to those that allow to access new liquidity in typology 1 and typology 2. Benefits and costs are solutions specific, hence the ones that emerged from the analyses simply followed the clustering of solutions of the different typologies. Below a detailed explanation of each typology (*See Figure 3, Figure 4 and Figure 5*).

Beyond the creation of the three typologies, we have also classified contingent factors according to three groups that make clearer the difference among the three typologies and reduce the number of variables. The first one is ***Firm's eligibility***, that encompasses, *Balance sheet composition, Marketability*, *Combination of physical assets and receivables, Financial economic situation of the firm*, variables important for the providers to make the company eligible for the ABL solution adoption. The second group is ***Technology***, that encompasses *Visibility* and *Technology obsolescence.* The third one is the ***External framework***, that is made by the variable *Legal system*. Results showed that not all the typologies are driven by all these factors, and the differences can be seen in Figure 3, 4 and 5.

The pledged typology

The first typology, called *"The pledged",* groups together IFTM, IFDM e EBL. These solutions are characterised by the fact that the adopter needs to pledge one asset (inventory or equipment) to obtain financing. The pursued objective in adopting this solution is therefore to access new liquidity. This is in line with what emerges in literature, where generally academics study the inventory financing solutions as a complementary opportunity to support the working capital in the short term (Buzacott & Zhang, 2004; Hofmann, 2009). From the cross-case analyses common contingent factors emerged as impactful among the solution of this typology: marketability of assets and the legal system came out to be strongly relevant to get the funding. While the marketability is an established factor among academics (Gavazza, 2010), our findings deepen the knowledge as they clarify which and how specific aspects are considered: the existence of a marketing channel to re-sell goods, the characteristics of the products (raw materials, WIP, finished products) and the type of asset (inventory/equipment) are the discriminant variables. Generally, when raw materials are pledged, it is easier to obtain a financing as they have more marketing and distribution channels and can be resold easily in different industries (in case of debtor's insolvency). While finished products and equipment increase the lender's risk and imply more difficulty to access the financing. The legal system emerged as an important aspect for all the solutions from a practical side: the presence of specific laws, often country-specific such as the non-possessory pledge law, enables the adoption of these solutions. This finding further increases the results obtained by Berger and Udell (2006) and Calomiris et al. (2017) about the importance of the country's legal infrastructure. By assuming the perspective of CT, it may be said that the context (legal system), firms' characteristics (economic and financial situation of the firm) and assets' characteristics (marketability of the assets) determine a certain *response variable* (in this case, IFTM, IFDM

and EBL).

The main benefits stemming from their adoption are financial: the objective of accessing new liquidity is translated into an increase of liquidity and cash flow. Moreover, in the Traditional and Delegation Model also operational and supply chain benefits are achieved. Indeed, the borrower increases internal process efficiency taking advantage from the integration of financial and logistics service providers. When the inventory storage process starts to be managed by a LSP, generally involved in these solutions, the borrower can gain efficiency benefits due to a reduction of costs and time. While the interest rate paid to the financial service provider is the main cost associated to the financing agreement. Furthermore, implementation costs are linked to the initial appraisal and the installation/integration of the IT system. They have lower incidence than use costs and have to be sustained by the borrower to set up the solution.

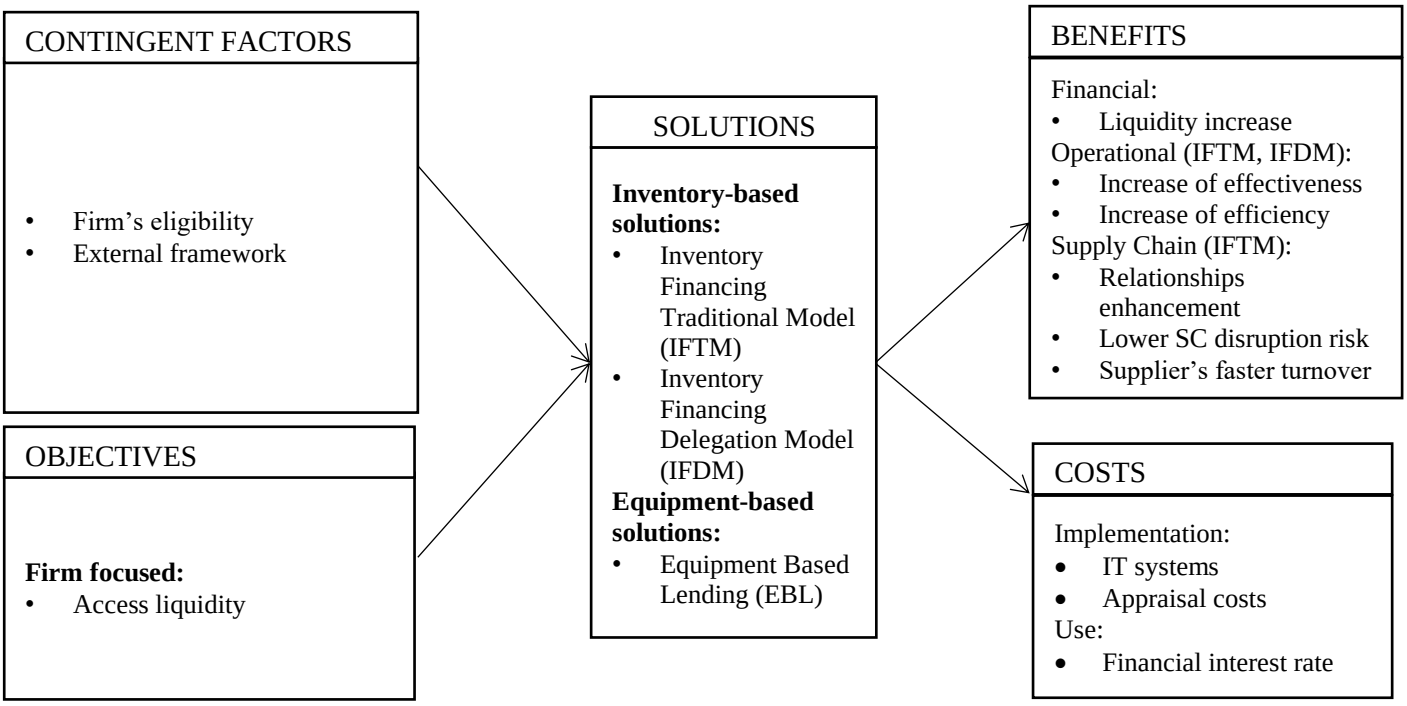

Figure 3: typology 1 – The pledged.

The efficient typology

The second typology, called *"The efficient"*, consists of the only IFCM solution. Also in this case, the increase of liquidity is one of the objective of adoption, in line with literature (Chen and Hu, 2011). Actually, it emerged that companies that adopt this solution pursue another important objective: asset derecognition and improvement of their balance sheet position.

IFCM implies a sale of assets (inventories) to a third-party player, and companies adopt it to derecognize them from the balance sheet and decrease the managing and holding costs associated to stocks. The actor (buyer or supplier) that transfers the inventory ownership to the LSP improves its balance sheet indicators, such as Return on Assets and Asset Turnover, because of the derecognition.

This solution is an evolution of the other inventory financing models, hence the contingency factors that affect the adoption of ICM are the same of IFTM and IFDM, even if with a different extent in their effect. In IFCM, the marketability of the asset is not as relevant as in solutions belonging to typology 1. This is because in IFCM stocks are not pledged but sold to a LSP, that already has a final customer to whom re-sell the assets. Hence, there is less need to have high marketable goods. Similarly, it is not needed to look at firm's eligibility, in terms of balance sheet composition and combination of physical assets and receivables, to offer this solution, as it happens for solutions belonging to typology 1. Contrary, a contextual factor assumes a high relevance, that is the legal system: in order to make off-balance sheet financing and to enable IFCM, a legal system with specific laws regulating the change of ownership from the customer to the LSP is necessary. Another factor plays a fundamental role: in order to obtain off-balance sheet financing and to enable IFCM, this solution requires the presence of an external actor, often represented by a logistics service provider which acts as an intermediary and financial provider, eventually partnering with a financial institution. This confirms the findings in literature about the roles and responsibilities of different players within the ecosystem of SCF (Bals, 2019) and especially the importance of LSP in the adoption of different SCF solutions (Hofmann and Kotzab, 2010).

Benefits are not only financial, but the efficiency is increased as the adopter has no longer to bear inventory costs such as labour, storage and management costs. Additionally, suppliers' turnover becomes faster: it could happen that a supplier has financial constraints and would like to reduce its DSO, but the buyer is not able to pay the supplier earlier. The supplier asks the LSP intervention and due to the implementation of the IF Control Model, the LSP purchases inventory from the supplier shortening its DSO, and then it sells them to the buyer which can pay with the same time length as before. This extends the findings by Lamoureux and Evans (2011) that described the structure and benefits of a typical loan based on IF control model. This solution involves some other costs, given its peculiarity, that are related to the insurance options that may be activated, generally included in the mark-up for the purchase of inventories (previously explained in the costs paragraph). Implementation costs are due to the IT system and inventory appraisal costs: the IT systems costs depend on the customer digitalisation level:

the higher it is, the lower the implementation cost. This is extremely important for this solution as through IT system a high level of visibility can be reached, that is a contingency factor affecting this type of solution.

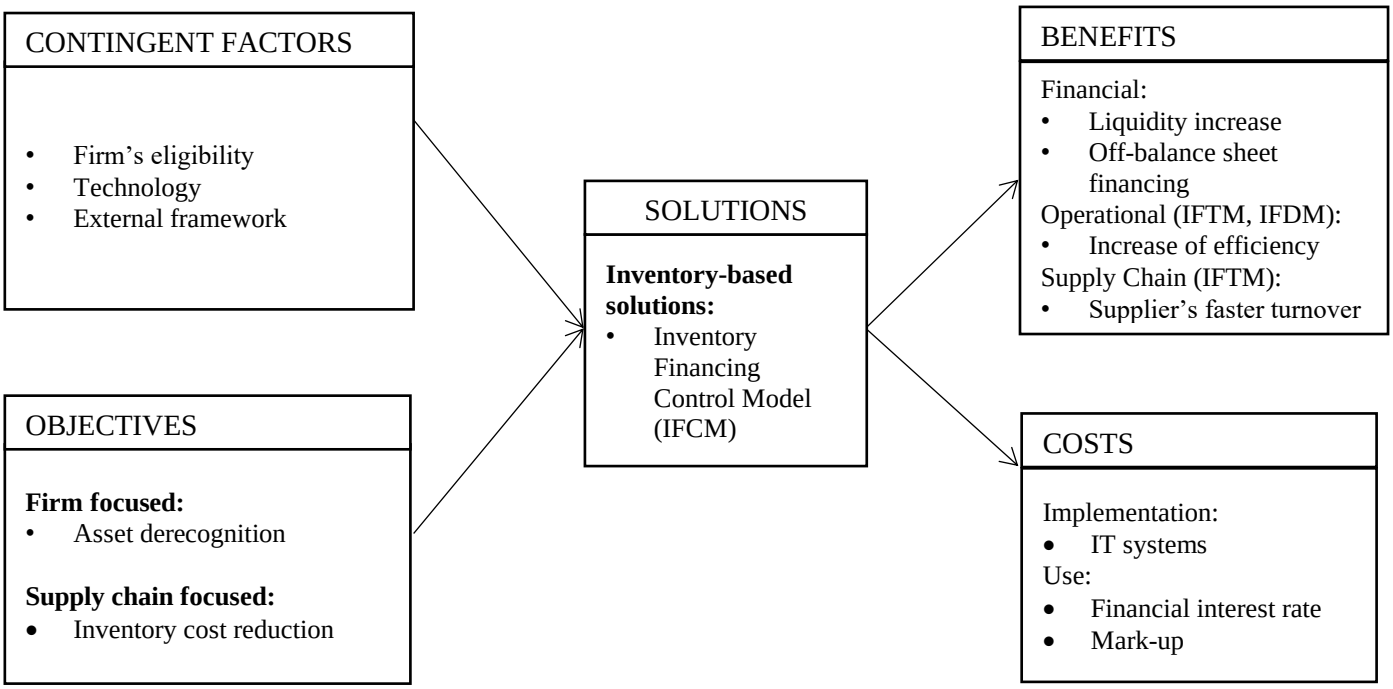

Figure 4: typology 2 – The efficient.

The leasing typology

The third typology, called *"Leasing"* is characterized by four solutions: leasing (OL and FL)) and sale and leaseback (both OL and FL). For both, there are common objectives that differ from the other two typologies. The first difference is about the objective of liquidity increase: while in typology 1 and 2 this objective is pursued by accessing new liquidity, leasing solutions allow to preserve existing liquidity as the equipment can be used without buying it. Sale and leaseback solutions have the same advantage, plus it involves the initial sale of the equipment that generates additional liquidity. Thus, both leasing and sale and leaseback make available the equipment without bearing a capital expenditure, allowing to preserve existing liquidity that may be used to better run the operations (operational benefits). The other objective that the adopters pursue is the greater flexibility for the company, since the assets is not shown in the balance sheet, and also a greater flexibility in managing the assets, especially achieved through operative leasing options: not only they can use the assets without owning it, but they also allow to easily end or lengthen the contract, with the possibility to have a technological upgrade of the equipment. This finding confirms what expressed by Duke et al. (2009) about the adopter's

willingness of obtaining an off-balance sheet financing of assets, but it adds this operational opportunity provided by the solutions and sought by companies about the better management of assets. For sale and leaseback, another target is the asset derecognition, achieved through the initial sale of the asset. This increases the flexibility of the adopter, also optimizing its balance sheet position. This finding is perfectly in line with what we found in literature and expressed in a study conducted by Ling (2012). There is a leasing-specific objective: tax shield. This is one of those variables that emerged in only one paper (Schallheim, et al., 2013), but all practitioners have suggested it as relevant. This solution is often adopted with the aim of obtaining tax benefits: as previously explained, periodic fees charged by providers are deductible. The benefit stems from the shorter time window of leasing in comparison to the depreciation time in case of direct purchase (generally associated to the lifetime of the asset). Being the period shorter, periodic fees are generally higher than the depreciation rates, and the deductible amount is higher involving a tax benefit. This is associated with one of the contingency factors relevant to this typology: the legal system. In fact, this objective is translated into a benefit only if the legal frame of the country where the adopting company operates allows it. Concerning another contingent factor that is leasing-specific, technology obsolescence emerged from the interviews to be a strong contingent factor as a discriminating variable between operational and financial leasing. This is one of the variables that were added at the revised framework. This finding can be useful for managers when they have to decide which type of leasing to adopt: in the case of a high risk of technological obsolescence, the lessee prefers an operative leasing to a financial one because it can replace the asset once it has become obsolete without having to purchase it at the end of the lease. Moreover, for these solutions the lending is not only based on the marketability and technology obsolescence of the equipment, but the lender takes into consideration also the financial and economic situation of the firm: a financially stable situation of the adopting company is a necessary condition to assure the eligibility for the financing.

Sale and leaseback solutions see also economic benefits due to the off-balance sheet financing and an improvement of the balance sheet position. Also the operational and supply chain benefits that are specific to operative and financial leasing are worth to be mentioned: these types of solutions generally involve not only the financer and the adopter, but also the equipment's vendor. The relationships among these players increase and the vendor gains from a higher certainty of being paid compared to the situation where the leasing agreement occurs between 2 parties (the vendor and the customer). Indeed, the financer buys the equipment and pays in advance the vendor and then offers it to the adopting company through a leasing

solution. These solutions involve implementation costs related to the setup of the solution (generally administrative and contract management costs) and an upfront payment from the adopting company (it ranges from 10 to 15% of the leasing value); then there are also use costs that are related to periodic fee/instalment that can be either monthly or quarterly. This contributes to extend the actual findings in literature about these solutions' costs that have never be clustered in this detail and specificity.

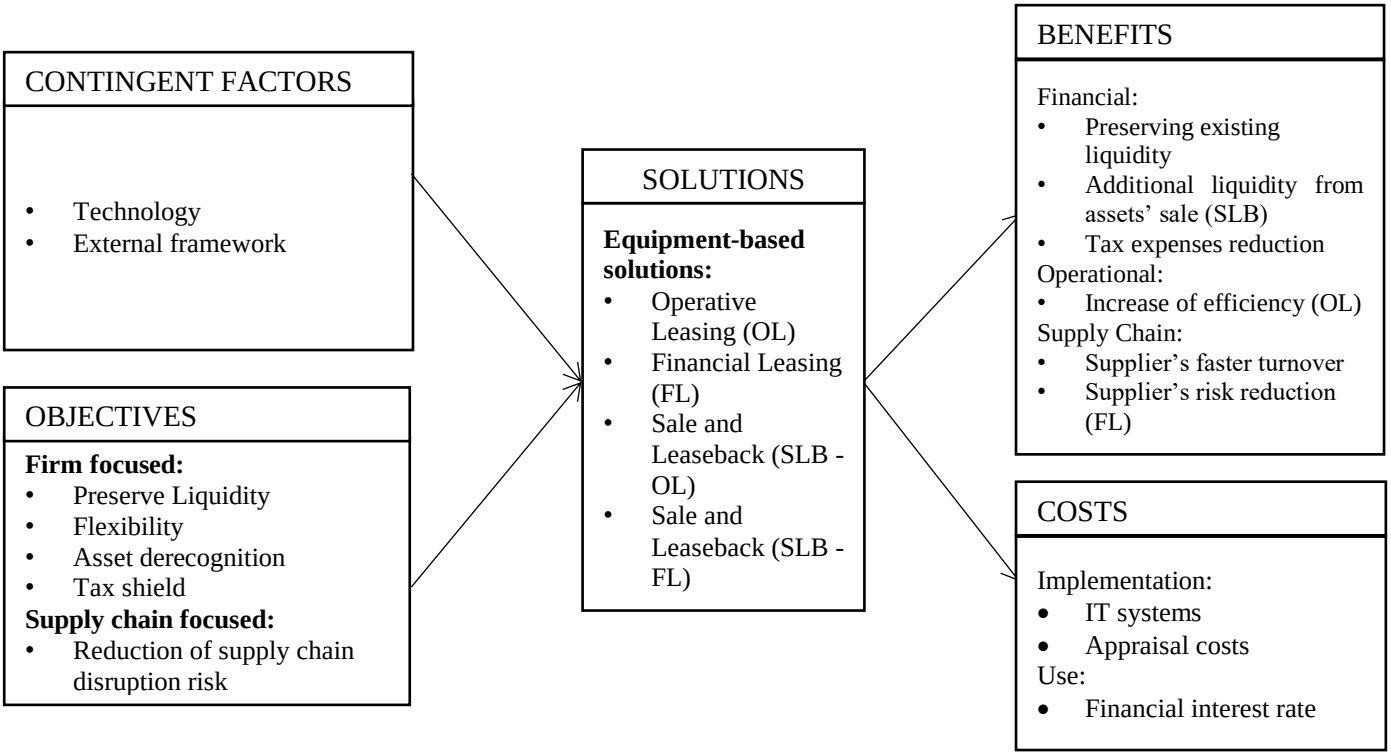

Figure 5: typology 3 – The leasing.

Propositions

The typologies have provided a clear understanding on why and how companies adopt ABL solutions, we now theorize our results in form of propositions to generalize findings:

P_1 = companies adopt ABL solutions primarily to pursue the objective of liquidity increase.

This can be achieved in two ways, i.e. either accessing new liquidity (IFTM, IFDM, EBL, IFCM), or by preserving existing liquidity (OL, FL, S&L (OL), S&L (FL)).

P_2 = companies adopt IFCM to obtain an improvement of their balance sheet by reducing inventories.

This solution will provide better balance sheet indicator by transferring the inventory ownership to the LSP and derecognizing the assets from the balance sheet.

P_3 = companies adopt leasing solutions (OL, FL, S&L OL, S&L FL) to preserve existing liquidity by using assets without bearing the investment costs and without owning them.

Leasing solutions are therefore chosen to pursue also a flexibility objective since firms can easily change or dismiss an asset.

P_4 = specific contingency factors play a fundamental role in determining the adoption of ABL solutions:

- **$P_{4.1}$ = balance sheet composition, combination of physical assets and receivables and the marketability of the goods determine the firm's eligibility to use IFTM, IFDM and EBL.**
- **$P_{4.2}$ = the legal system affects the possibility to adopt IFCM**. Specific laws that regulate the change of ownership from the customer to the LSP are necessary, otherwise the off-balance sheet financing cannot be pursued.
- **$P_{4.3}$ = the technology obsolescence is a discriminant variable in adopting OL rather than FL solution.** Operative Leasing is preferred when the equipment is affected by high technology-obsolescence risk. In fact, OL would allow to easily replace the equipment with a more advanced one after few years, contrary to FL in which the company is obliged to buy the asset at the end of the agreement term.

  Another context factor is crucial: the legal system. Leasing solutions allow to obtain tax benefits: periodic fees charged by providers are deductible. Indeed, this can be translated into a real benefit only if the country in which the adopter operates has a legal system that provides these tax advantages.

P_5 = the main benefit achieved through ABL solutions is the increase of financial liquidity.

It may be achieved either by accessing new liquidity (IFTM, IFDM, IFCM, EBL) or by preserving existing liquidity (OL, FL, S&L (OL), S&L (FL)).

Other benefits can be achieved:

- **$P_{5.1}$ = solutions belonging to the typology 1 allow to obtain also operational and**

supply chain benefits. The involvement of a LSP that manages the process of holding inventories allows to obtain efficiency and effectiveness. Furthermore, these solutions imply a collaboration among the different players that enhances the relationships among the supply chain.

- **$P_{5.2}$ = IFCM allows to obtain further financial benefits by derecognizing the assets from the balance sheet.** The sale of inventories to a third-party player implies also efficiency improvement: the adopter has no longer to bear inventory costs such as labour, storage and management costs. Additionally, suppliers' turnover becomes faster, improving also its economic and financial situation.
- **$P_{5.3}$ = leasing solutions provide tax reduction benefit.** The periodic fee is deductible. This deductible amount is higher than the depreciation a company would gain in case of direct purchase. This is due to the shorter time window a leasing option involves in comparison to the depreciation time window (generally associated to the lifetime of the asset). Hence, there is a tax advantage that can be exploited. Another important financial benefit coming from S&L solutions is the increase of additional liquidity coming from the asset sale.

P_6 = the main cost stemming from ABL solutions is financial. In particular, for solutions in which a good is pledged (IFTM, IFDM, EBL) the main cost is related to the fee associated to the debt repayment. Leasing solutions imply a cost structure for which periodic fees are paid by the adopter to the financial service provider for the use of the equipment.

Other peculiar costs are implied by the adoption of these solutions:

- **$P_{6.1}$ = solutions belonging to typology 1 involve also implementation costs related to the appraisal of the pledged goods and the implementation of the IT system.** In fact, there is an initial appraisal of the inventories or equipment to determine their value and the maximum cap of the loan. Moreover, an IT system is fundamental to track the stocks' conditions while thy are pledged.
- **$P_{6.2}$ = IFCM involves also implementation costs related to the IT system and a mark-up.** The mark-up is associated to the sale of inventories and covers the logistic management, the financing of the inventories and it may involve also an extra for the insurance option.
- **$P_{6.3}$ = leasing solutions are characterized by high implementation costs.** Indeed, high administrative and contract management costs are required to set-up these solutions.

Moreover, sale and leaseback solutions imply also an upfront payment that is paid by the adopting company that ranges from 10 to 15% of the leasing value.

Conclusions

This paper aims at investigating an under explored area of SCF, i.e. Asset Based Lending. Studies in this research stream, that comprehend both inventory-based solutions and fixed-assets financing, are few in literature. Buzacott and Zhang (2004) were among the firsts to investigate financial solutions linked to inventories. Gomm (2010) provided further contributions including also solutions based on fixed and non-current assets. Gelsomino et al. (2016) outlined how this is a relevant stream that can be included within the scope of SCF and more recently Caniato et al. (2019) suggested to further investigate this research stream since they are relevant for the financial management of supply chains but they are still underinvestigated. Indeed, as shown in table 2, only few studies have explored ABL solutions with a SCF perspective. Table 2 shows that most of the studies are focused on inventory-based solutions and the ones dedicated to equipment-based ones adopt a financial perspective. Moreover, only few authors have adopted a theoritical lens to investigate this study field and, in particular, only Martin and Hofmann have used the contingency theory to study the adoption of SCF solutions. Thanks to a throughout literature review, a research framework considering objectives, contingent variables, ABL solutions, costs and benefits was developed. Literature about SCF helped the definition of the variables of the framework, but the analysis of the links between objectives and contingent variables for the selection of ABL solutions, as well as the link between ABL solutions and costs and benefits was poor. Grounded in the contingency theory and thanks to the analysis of 25 observations, the paper identified new variables added to the revised framework and three main typologies of solutions, defined in terms of objectives, contextual factors, benefits and costs, thus supporting the implementation of ABL solutions. This study not only confirmed what found in literature, but further extended the knowledge about the contingent factors that favours the adoption of ABL solutions, the objectives pursued by companies through their adoption and the stemming performance, in terms of benefits and costs. Six propositions and nine sub-propositions that explain the different typologies of adoption have been formulated. By doing this, authors have tried to theorise the results and findings obtained from the case study analyses.

Although exploratory, the paper provides a contribution to both theory and practice. In terms of theoretical contribution, the paper extends the concept of SCF to the set of ABL solutions,

thus extending the scope of SCF beyond the well-known receivable finance (i.e. Reverse Factoring and Dynamic Discounting), covering also inventory and fixed assets. In addition, the contingency theory perspective adopted in the paper allows a more comprehensive and nuanced understanding of the decisions about the adoption of ABL solutions.

The results obtained jointly consider different ABL solutions, both those based on inventories and those based on equipment, which are generally investigated separately. Moreover, the paper extends SCF literature, by identifying the main relevant variables that have an influence in the process of adoption. Thanks to the results of the empirical research, the main criteria for the adoption of each specific solution were identified, exploring also new factors. Particularly relevant and noteworthy is the role that the legal system plays in the implementation of all solutions: for those belonging to the typology 1 (the pledged), the presence of a registry over security interests and the presence of a law concerning the non-possessory pledge is a necessary condition to implement. Furthermore, the presence of fiscal incentives when leasing solutions are adopted is a strong enabler (i.e. the possibility to deduct the leasing fees). Other contingent factors that impact on the company's eligibility for financing are the marketability of pledged assets, the financial economic situation of the firm and the combination between physical assets and receivables. To mitigate the risks linked to the financing, the presence in the balance sheet of other easily monetizable assets is a necessary condition for the provider to grant the financing. Specific to the leasing solutions, the technology obsolescence of the equipment acts as a discriminant variable in the choice between operative and financial leasing. About the objectives of adoption, the most relevant is an increase in liquidity. Our research explains how this aim can be achieved in two ways, depending on the solutions adopted. The solutions in the first two typologies allow to access to liquidity obtaining new financing, while those in the third typology allow to increase financial availability by preserving existing liquidity. Solutions' specific objectives emerged from the interviews are two: (i) the inventory cost reduction, typical of IFCM as it implies the sale of inventories to a third-party; (ii) fiscal incentives, typical of leasing solutions, that can be exploited by companies by deducting the leasing fees. In line with existing literature, we confirm that the main benefits are financial, as well as costs.

From a practical and managerial perspective, the paper provides a decision-making tool for managers who are considering the adoption of ABL. The six propositions and sub-proposition describe different ways of adopting ABL solutions and how each variable can have a different impact on it. Indeed, as shown in the different typologies, the investigated solutions are strictly linked to objectives of adoption and to congingent factors that have been considered.

Propositions can give managers a clear understanding about which solution is better to adopt, given the objectives of adoption of the firm and its context. Having explained benefits and costs deriving from each solution, managers will have at their disposal a useful tool through which carrying out a cost-benefit analysis that supports the decision about whether and which solution to adopt. The findings also have value for solutions' providers: financial providers can understand how to adapt their solution offerings based on their customers' objectives and characteristics and how to manage the adoption process in the most efficient and effective way possible, considering all relevant aspects, so as to propose a low-risk solution that is winning for all parties involved.

The paper presents also some limitations, some of which might open opportunities for further research. First of all, the analysis is mainly qualitative, without any statistical confirmation of the relations hinted. Further, analysis of costs and benefits is just qualitative: additional studies might try to assess and quantify them. Future research could use more quantitative methods to define the relative importance of variables (e.g. survey) and to validate the identified typologies. Additionally, only SCF providers were interviewed, not including borrowers in the sample. This was a sample selection criteria as it allows to leveraging providers' experience in offering the same solution to many clients, collecting their perspective about commonalities and differences among different users. The cons of this approach was the loss of a dyadic view. Of course, future research can deepen the single cases of adoption, by interviewing both borrowers and providers, to also make a comparison among their perceptions, which could result different. Finally, we used contingency theory in this study, who has itself some limitations, given its descriptive nature. By using this theory, we are assuming that results are not universal but apply only to specific situations according to the contingencies we considered. Moreover, contingency theory explains reality in a reactive approach, as managers cannot take the proper decision in advance but they need to base them on the contingencies, but the process to identify them is long and costly. Hence, the framework we propose is reactive in its nature and not proactive.

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Appendix A - Coding Table

Objectives		Contingent factors		Benefits		Costs	
Variables	**Codes**	**Variables**	**Codes**	**Variables**	**Codes**	**Variables**	**Codes**
Liquidity increase	Access new financing	**Balance sheet composition**	Amount and balance between existing current and non-current assets	**Financial**	Cash flow increase	**Planning**	Solutions scouting costs
	Unlock existing liquidity	**Loan-to-value (LTV) ratio**	The percentage of the value of the pledged assets that can be offered as a loan		Off balance sheet financing		Decision-making costs (analysis, consultancy, etc).
	Reduce liquidity disbursement	**Marketability of underlying assets**	Existing marketing channel		Improvement of financial indicators	**Implementation**	Initial appraisal costs (costs to determine the orderly liquidation value (OLV)
Flexibility	Asset sale/rental		Product charactesristics (Raw materials, WIP, finished goods)		Cash flow and working capital optimisation		IT system (costs due to the implementation of systems needed for monitoring and providing visibility among adopter and financer)
	Easiness in upgrading the equipment/assets		Type of equipment		Fiscal incentives, tax reduction		Setup costs (administration, contract management costs)
Asset derecognition	Remove the asset from the balance sheet and improve balance sheet position	**Visibility along the chain**	Digitalisation	**Economic**	Improvement of economic indicators		Upfront payment (initial payment)
Reduction of supply chain disruption risk	Bunkruptcy		Collaboration among partners		Increase turnover of inventories	**Use**	Financial costs (monthly/quarterly/annual interest rate)
	Insolvency/discontinuity	**Legal system**	ABL specific laws (es. non-possessory pledge, presence of a national registry over interest security)	**Operational**	Increase of efficiency (reducing warehousce space, reducing COGS)		Periodic fee/instalment (service cost)
	Granting continuity along the chain		Accounting system/standard		Increase of effectiveness along the chain		Mark-up on purchasing/selling price (including the insurance): cost specific to IFCM related to

							the markup the LSP applies for the purchase of inventory
Minimization of supply chain cost of adoption	Solution's adoption cost from a suplly chain perspective	**Combination of physical and monetary assets**	Balance between non-current assets and monetizable assets (receivables, cash)	**Supply Chain**	Collaboration and relationships enhancement with suppliers		
Reduction of supply chain cost of capital	Financial cost reduction	**Financial and economic situation of the firm**	Stability of the company under a financial and economic perspective. Check of financial and economic indicators.		Supplier financial benefits (turnover increase)		
	Inventory cost reduction	**Technology obsolescence**	Risk of obsolescence of the pledged asset				
Tax shield	Fiscal incentives offered by ABL solutions		Age of the pledged assets				
	Reducing tax expenses						

Figure 6: coding table.

Appendix B – Interview protocol

#Q	Question	Measured Variable	RQ	Possible Follow-up questions
1)	Can you describe in detail the ABL solutions that you offer in terms of typology, involved actors, functioning and target customers?	Solutions	-	-
2)	Which are the main reasons why a firm select an ABL (inventory finance/equipment finance) solution?	Objectives	RQ1	Do your customers look just for firm-specific solutions or they also put forward the needs of their supply chain?
3)	What are the variables that you take into account to define if a company is eligible for it? And those taken into account by the customer in the selection?	Contingent factors	RQ2	Do you consider balance sheet composition/Marketability/Visibility as relevant factors driving the selection of the right solution? How do you think LTV is influencing the decision of your customer between one solution and another (for traditional and Delegation IF, EF)?
4)	What are the benefits and costs of a firm selecting an ABL solution?	Benefits and costs	RQ3, RQ4	-
5)	Can you provide us with a meaningful case describing the customer specific characteristics, the reasons why he adopted that solution, the associated costs and benefits and the level and impact of the collaboration?	All	RQ1, RQ2, RQ3, RQ4	-

Table 8: interview protocol.

Appendix C - Cross-Case Analysis

		IFTM					IFDM				
		A	**F**	**G**	**H**	**I**	**B**	**C**	**H**	**L**	**M**
Objectives	**Access Liquidity**	Need: access liquidity Purpose: financing inventory, quick financing By: pledging assets	Need: access liquidity Purpose: financial constraints By: pledging assets without dispossession	Need: access liquidity Purpose: cannot get credit otherwise, growth, financial constraints, seasonal business By: pledging assets	Need: access liquidity Purpose: financial constraints, cannot get credit otherwise, growth, seasonal business, supporting M&A, quick financing. By: pledging assets without dispossession	Need: access liquidity Purpose: cannot get credit otherwise, financial constraints, growth, seasonal business, cheaper financing By: pledging assets	Need: access liquidity Purpose: cheaper financing By: pledging assets	Need: access liquidity Purpose: cheaper financing By: pledging assets	Need: access liquidity Purpose: financial constraints, cannot get credit otherwise, growth, seasonal business, supporting M&A, quick financing By: pledging assets without dispossession	Need: access liquidity Purpose: financial constraints, cannot get credit otherwise By: pledging assets	
	Preserve Liquidity										
	Asset Derecognition										
	Flexibility										
	Reduction of supply chain disruption risk										
	Reduction of supply chain working capital cost			Need: reducing working capital in the supply chain Purpose: paying suppliers							
New Objectives	**Tax Shield**										
	Inventory cost reduction										

Figure 7: cross-case analysis – objectives (IFTM, IFDM).

		IFCM				EBL			
		B	**J**	**K**	**N**	**A**	**G**	**H**	**I**
Objectives	**Access Liquidity**			Need: access liquidity Purpose: faster turnover By: selling inventory	Need: access liquidity Purpose: financing inventory By: selling inventory	Need: access liquidity Purpose: financing equipment, fulfilling a new order, quick financing	Need: access liquidity By: pledging assets	Need: access liquidity Purpose: cannot get credit otherwise, growth, supporting M&A, quick financing By: pledging assets	Need: access liquidity Purpose: cannot get credit otherwise, growth, seasonal business, cheaper financing, financial constraints By: pledging assets
	Preserve Liquidity								
	Asset Derecognition	Need: improving balance sheet position How: off-balance sheet financing		Need: improving balance sheet position How: off-balance sheet financing	Need: improving balance sheet position How: off-balance sheet financing				
	Flexibility								
	Reduction of supply chain disruption risk			Need: reducing working capital in the supply chain Purpose: reducing supplier's DIH and DSO, lengthening customer's DPO					
	Reduction of supply chain working capital cost		Need: reducing inventory costs How: Control Model on not core business inventory	Need: reducing inventory costs					
New Objectives	**Tax Shield**								
	Inventory cost reduction								

Figure 8: cross-case analysis – objectives (IFCM, EBL).

		OL		FL			SLB(OL)	SLB(FL)
		D	E	D	E	O	D	D
Objectives	**Access Liquidity**							
	Preserve Liquidity	Need: reduce liquidity disbursement Purpose: supporting firm growth, to finance a new equipment, exploit business opportunities Timing: quick financing	Need: reduce liquidity disbursement Purpose: significant investment	Need: reduce liquidity disburs ment Purpose: growth, financing equipment, exploiting business opportunities, quick financing By: leasing equipment	What: reduce liquidity disbursement Why: significant investment By: leasing equipment	Need: reduce liquidity disbursement Purpose: financing equipment, quick financing By: leasing equipment	Need: access liquidity, reduce liquidity disbursement Purpose: financing equipment, exploiting business opportunities, balancing cash flow, cannot get credit otherwise, financing other debts, supporting M&A By: selling equipment, leasing equipment	Need: access liquidity, reduce liquidity disbursement Purpose: financing equipment, exploiting business opportunities, balancing cash flow, cannot get credit otherwise, financing other debts, supporting M&A By: selling equipment, leasing equipment
	Asset Derecognition	Need: improve balance sheet position How: off-balance sheet financing					Need: improving balance sheet position, supporting M&A How: of-balance sheet financing	
	Flexibility	Need: Flexibility in managing the assets How: using equipment without owning it, paying for the service	Need: flexibility in managing the assets How: possibility to end or lengthen the contract, possibility to have a technological upgrade of the equipment				Need: flexibility in managing the assets How: using the equipment without owning it, paying for the service	
	Reduction of supply chain disruption risk	Need: granting continuity of activities along the chain		Need: granting continuity of activities along the chain				
	Reduction of supply chain working capital cost							
New Objectives	**Tax Shield**		Need: reducing tax expenses Purpose: fully deducting interest rate How: leasing equipment		Need: reducing tax expenses Purpose: partially deducting interest rate How: leasing equipment			
	Inventory cost reduction							

Figure 9: cross-case analysis – objectives (OL, FL, S&L (OL), S&L (FL)).

		IFTM					IFDM				
		A	**F**	**G**	**H**	**I**	**B**	**C**	**H**	**L**	**M**
Contingent factors	**Balance Sheet Composition**	Type of asset: inventory Quantity: high Importance: necessary				Type of asset: inventory Quantity: high Importance: necessary		Type of assets: inventory Quantity: high Importance: necessary			
	Marketability		Influence factors: channel, characteristics of inventory Channel: presence of a specialised third party taking care of reselling goods Importance: necessary Characteristics of inventory: FG Importance: eligible	Influence factors: characteristics of inventory Characteristics of inventory: RM Importance: eligible Characteristics of inventory: WIP Importance: not eligible	Influence factors: characteristics of inventory Characteristics of inventory: WIP Importance: not eligible Characteristics of inventory: FG Importance: eligible	Influence factor: channel, characteristi s of inventory Characteristi s of inventory: high marketable goods Importance: necessary Channel: presence of a third party taking care of reselling goods Importance: necessary	Influence factors: channel Channel: presence of a specialised third party taking care of reselling goods Importance: necessary	Influence factors: channel, characteristics of inventory Channel: presence of a specialised third party taking care of reselling goods Importance: necessary Characteristics of inventory: marketable goods, commodity items Importance: necessary	Influence factors: characteristics of inventory Characteristics of inventory of inventory: WIP Importance: not eligible Characteristics of inventory: FG Importance: eligible	Influence factors: characteristics of inventory Characteristics of inventory: high marketable goods Importance: necessary	Influence factors: characteristics of inventory Characteristics of inventory: FG, RM, WIP Importance: eligible
	Visibility/Digitalisation	Method: IT system Type of visibility granted: realtime Granting visibility on: inventory data Importance: necessary	Method: IT system Granting visibility on: inventory status Importance: not necessary	Method: IT system Type of visibility granted: realtime Importance: necessary	Method: IT system Type of visibility granted: batch (weekly) Granting visibility on: inventory data, status, age Importance: necessary	Method: IT system Type of visibility granted: realtime Granting visibility on: cash flows Importance: necessary	Method: IT system, tracking and tracing system Type of visibility granted: real-time Granting visibility on: inventory status, quantity, movements, value Importance: necessary	Method: IT system Type of visibility granted: realtime Granting visibility on: inventory status, movements and value Importance: necessary for low creditworthiness clients	Method: IT system Type of visibility granted: batch (weekly) Granting visibility on: inventory data, status, age Importance:necessary		Method: - Type of visibility granted: - Granting visibility on: inventory data
New contingent factors	**Legal System**			Legal aspect: presence of a registry of security interests Importance: necessary	Legal aspect: presence of a registry of security interests Importance: necessary Legal aspect: non-possessory pledge Importance: necessary	Legal aspect: centralized registry Importance: necessary	Legal aspect: presence of a registry of security interests Importance: necessary	Legal aspect: presence of a registry of security interests Importance: facilitating the solution Legal aspect: non-possessory pledge Importance: facilitating the solution	Legal aspect: presence of a registry of security interests Importance: necessary Legal aspect: non-possessory pledge Importance: necessary	Legal aspect: presence of a registry of security interests Importance: necessary	
	Combination of physical assets and receivables			What: combination of inventory and receivables Importance: necessary	What: combination of inventory and receivables Importance: necessary (for distributors and manufacturers)	What: combination of inventory and receivables Importance: not necessary		What: combination of inventory and receivables Importance: necessary (for distributors and manufacturers)			
	Financial & Economic situation of the firm		What: revenues higher than 2 million € Importance: necessary			What: record keeping validity Importance: necessary					
	Technological obsolescence										

Figure 10: cross-case analysis – contingent factors (IFTM, IFDM).

		IFCM				EBL			
		B	**J**	**K**	**N**	**A**	**G**	**H**	**I**
Contingent factors	**Balance Sheet Composition**				Type of asset: inventory Quantity: high Importance: necessary	Type of assets: equipment Quantity: large amount Importance: necessary	Type of assets: equipment Quantity: high Importance: necessary		Type of asset: equipment Quantity: high Importance: necessary
	Marketability				Influence factors: characteristics of inventory Characteristics of inventory: FG Importance: eligible Characteristics of inventory: RM, WIP Importance: not fully eligible Characteristics of inventory: goods with stable demand Importance: necessary				Influence factors: characteristics of equipment Characteristics of equipment: high market value
	Visibility/Digitalisation		Method: IT system Type of visibility granted: batch, realtime (depending on the customer) Granting visibility on: inventory quantity and status Importan e: necessary					Method: digital registry Type of visibility granted: - Granting visibility on: equipment identification codes Importance: necessary	
New contingent factors	**Legal System**	Legal aspect: derecognition through ownership shift to the LSP Importance: necessary			Legal aspect: derecognition through ownership shift to the LSP Importance: necessary	Legal aspect: presence of registry of security interests Importance: necessary	Legal aspect: presence of a registry of security interests Importance: necessary	Legal aspect: presence of a registry of security interests Importance: necessary	Legal aspect: presence of a registry of security interests Importance: necessary
	Combination of physical assets and receivables						What: combination of equipment and receivables Importance: necessary	What: combination of receivables, equipment and inventory Importance: necessary (for revolving line of credit); not necessary (for term loan)	
	Financial & Economic situation of the firm		What: customer financial and economic evaluation Importance: not necessary	What: financial stability, strong demand profile Importance: necessary				What: business plan validity Importance: necessary	
	Technological obsolescence								

Figure 11: cross-case analysis – contingent factors (IFCM, EBL).

		OL		FL			SLB(OL)	SLB(FL)
		D	E	D	E	O	D	D
Contingent factors	**Balance Sheet Composition**							
	Marketability	Influence factors: channel, characteristics of equipment Channel: presence of a specialised third party taking care of reselling goods, exploiting vendor network Importance: necessary Characteristics of equipment: good quality, not specific Importance: necessary	Influence factors: channel Channel: presence of a specialised third party taking care of reselling goods, exploiting vendor network Importance: necessary	Influence factors: characteristics of equipment Characteristics of equipment: residual value Importance: necessary				Influence factors: characteristics of equipment Characteristics of equipment: new, less than 6 months old, high market value
	Visibility/Digitalisation					Method: paper-based granting visibility on: no visibility required		
New contingent factors	**Legal System**	Legal aspect: presence of fiscal incentives Importance: influence the choice between OL and FL		Legal aspect: presence of fiscal incentives Importance: influence the choice between OL and FL			Legal aspect: agreement of forfeiture (it. patto commissorio) Importance: necessary	Legal aspect: agreement of forfeiture (it. patto commissorio) Importance: necessary
	Combination of physical assets and receivables							
	Financial & Economic situation of the firm	What: financial and economic evaluation, operative assessment of customer's performances. Importance: necessary What: financial and economic evaluation Importance: necessary	What: financial and economic evaluation Importance: necessary	What: financial and economic evaluation, operative assessment of customer's performances Importance: necessary	What: financial and economic evaluation, operative assessment of customer's performances. Importance: necessary What: financial and economic evaluation Importance: necessary	What: customer creditworthiness, fit with customer business activities Importance: necessary	What: purpose of liquidity needs, solvency situation, customer creditworthiness Importance: necessary	What: purpose of liquidity needs, solvency situation, customer creditworthiness Importance: necessary
	Technological obsolescence	What: level of obsolescence of equipment Importance: influence the choice between OL and FL	What: level of obsolescence of equipment Importance: influence the choice between OL and FL; Reduction of obsolescence risk	What: level of obsolescence of the equipment Importance: influence the choice between	What: level of obsolescence of the equipment Importance: influence the choice between		What: level of obsolescence of the equipment Importance: influence the choice between	What: level of obsolescence of the equipment Importance: influence the choice between

Figure 12: cross-case analysis – contingent factors (OL, FL, S&L (OL), S&L (FL)).

		IFTM					IFDM				
		A	**F**	**G**	**H**	**I**	**B**	**C**	**H**	**L**	**M**
Benefits	**Financial**	Financial and economic indicators	Increase cash flow (LTV=100%), working capital improvement	Increase cash flow (LTV=75%, OLV=50%)	Increase cash flow (LTV=75%)	Increase cash flow (LTV=50%- 70% of inventory cost)	Increase cash flow (LTV*OLV=40%)	Increase cash flow	Increase cash flow (75% of OLV)	Increase cash flow (LTV range from 60% to 90%)	Increase cash flow
	Economic		Increase turnover					Increase turnover, increase growth			
	Operational		Increase effectiveness		Increase effectiveness: retaining inventory in the warehouse				Increase effectiveness: retaining inventory in the warehouse	Increase efficiency: reducing inventory management cost	
	Supply Chain	Better supply chain relationships	Avoid supply chain disruption			Supplier financial benefits					

Figure 13: cross-case analysis – benefits (IFTM, IFDM).

		IFCM				EBL			
		B	**J**	**K**	**N**	**A**	**G**	**H**	**I**
Benefits	**Financial**		Off-balance sheet financing, improvement of financial indicators	Pay on consumption, optimising cash flow, off-balance sheet financing, working capital improvement	Off-balance sheet financing, improvement of financial indicators, lower debt level	Higher financial benefits	Increase cash flow (LTV 65%, lower than LTV of inventory)	Increase cash flow (75% of OLV, lower than OLV of inventory)	Increase cash flow
	Economic								
	Operational		Increase efficiency: reducing inventory management cost, reducing complexity in managing supply base, JIT, more focus on the core business Increase effectiveness	Increase efficiency: higher efficiency along the chain, JIT, complexity reduction along the chain, reducing inventory management cost					
	Supply Chain			Faster turnover for the supplier, higher efficiency along the chain, complexity reduction along	Faster turnover for the supplier				

Figure 14: cross-case analysis – benefits (IFCM, EBL).

		OL		FL			SLB(OL)	SLB(FL)
		D	E	D	E	O	D	D
Benefits	Financial	Cash flow optimisation, fiscal incentives, improve financial and economic indicators, off-balance sheet financing	Tax shield (all the interest rate is deductive), improvement of financial indicators, off-balance sheet financing	Cash flow optimisation,fiscal incentives	Tax shield (the interest rate is deductive with a limit of 19% and the tax shield decrese in the final part of the contract)	What: cash flow optimisation, fiscal benefits	Financial indicators improvement, increase cash flow, cash flow optimisation, offbalance sheet financing	Increase cash flow, cash flow optimisation
	Economic						Increase turnover (capital gain), profit improvement	Increase turnover (capital gain), profit improvement
	Operational	Increase efficiency: more focus on core business	Increase efficiency: more focus on core business			Increase efficiency: lower purchasing cost		
	Supply Chain	Supplier faster turnover, supplier risk reduction		Supplier faster turnover, supplier risk reduction	Supplier faster turnover, supplier risk reduction	Supplier financial benefit		

Figure 15: cross-case analysis – benefits (OL, FL, S&L (OL), S&L (FL))

		IFTM					IFDM				
		A	F	G	H	I	B	C	H	L	M
Costs	Planning										
	Implementation	Cost type: IT systems integration		Cost type: appraisal cost Relevance: proportionate to financing amount (not	Cost type: IT system Relevance: low Cost type: legal fee, set-up fee	Cost type: appraisal cost, IT system	Cost type: IT system integration (between bank and customer) Relevance: low	Cost type: IT system Relevance: low Cost type: legal fee, set-up fee			Cost type: - Relevance: not always paid by the client, low
	Utilisation		Cost type: financial interest rate Timing: monthly pament, bullet (after 2 years) Relevance: high (2%-5%) Cost type: insurance Relevance: high	Cost type: financial interest rate Relevance: high	Cost type: financial interest rate Relevance: high (ranges from 12% to 16%)	Cost type: financial interest rate Relevance: high (20%) Cost type: monitoting cost Timing: monthly Relevance: (1500/2000 dollars)	Cost type: financial interest rate Relevance: high	Cost type: financial interest rate Relevance: low (should not damage the balance sheet of the firm)	Cost type: financial interest rate Relevance: high (range from 12% to 16%, higher than traditional bank loan)	Cost type: financial interest rate, inventory management cost (includes the insurance, additional services on Parmigiano forms, inventory holding costs)	Cost type: financial interest rate Relevance: low

Figure 16: cross-case analysis – costs (IFTM, IFDM).

		IFCM				EBL			
		B	**J**	**K**	**N**	**A**	**G**	**H**	**I**
Costs	**Planning**								
	Implementation		Cost type: IT system Relevance: low, depending on customer Cost: appraisal cost Relevance: low (2000 euro)	Cost type: IT system Relevance: high, main cost			Cost type: appraisal cost	Cost type: legal fee, set-up fee Importance: balanced respect to utilisation cost	Cost type: appraisal cost Cost type: IT system Relevance: not always paid by the client
	Utilisation		Cost type: mark-up (all inclusive) Relevance: (range from 7% to 20%)	Cost type: financial interest rate, markup Relevance: lower than implementation cost	Cost type: financial interest rate, insurance, mark-up		Cost type: financial interest rate Relevance: high Timing: periodically (amortised)	Cost type: financial interest rate Importance: high (range from 12% to 16%)	Cost type: financial interest rate Relevance: high (20%) Cost type: monitoring cost Timing: periodically

Figure 17: cross-case analysis – costs (IFCM, EBL).

		OL		FL			SLB(OL)	SLB(FL)
		D	**E**	**D**	**E**	**O**	**D**	**D**
Costs	**Planning**							
	Implementation					Cost type: setup fee Relevance: low	Cost type: contract management, document exchange Importance: low Cost type: setup fee Importance: potentially important Cost type: upfront payment Importance: high (10%-15% of the value of the leasing)	Cost type: contract management, document exchange Importance: low Cost type: setup fee Importance: potentially important Cost type: upfront payment Importance: high (10%-15% of the value of the leasing)
	Utilisation	Cost type: financial interest rate Relevance: main cost Cost type: additional services cost Timing: monthly/quarterly	Cost type: instalments (include also maintenance cost) Timing: periodically, monthly	Cost type: financial interest rate Relevance: main cost Cost type: additional services cost Timing: monthly/quarterly	Cost type: instalments (the interest rate is divided into two components) Timing: periodically, monthly Cost type: additional services cost	Cost type: instalment	Cost type: financial interest rate Relevance: main cost	Cost type: financial interest rate Relevance: main cost

Figure 18: cross-case analysis – costs (OL, FL, S&L (OL), S&L (FL)).