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THE ITALIAN FASHION SUPPLY CHAIN: THE ROLE OF E-COLLABORATION IN SUPPORTING FASHION HOUSE – LABOR SUPPLIERS' RELATIONSHIPS

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"Fashion is very important.
It is life-enhancing and, like everything that gives pleasure,
it is worth doing well."

(Vivienne Westwood)

Table of contents:

List Of Figures:

ABSTRACT

Fashion industry is a fast changing environment. Many studies have been performed among the topic of e-collaboration between fashion companies, aiming at identifying the major differentiating critical factors. This research project aims at understand the level of e-collaboration adoption in the Fashion supply Chain, and investigating the potential impact of the adoption of digital tools, from the Fashion House perspective. To better accomplish the goal, the research was conducted analyzing a sample of companies belonging to the Fashion Industry. This analysis of the main actors, activities, B2C and B2B processes, and the economic perspective allowed to provide a complete and interesting snap-shot of the Italian Fashion sector. Afterwards, the research follows with the development of an innovative holistic framework, which aims at identifying, synthetically and exhaustively, all the fashion companies attributes, characterizing the need of e-collaborative adoption. The definition of the major quantitative results has been fulfilled through the empirical implementation of the above mentioned framework on a sample of Italian Fashion Houses and in respect to their network of labor suppliers. Thus, matching the main analysed factors and the most suitable technological tools, the model can provide a good roadmap to identify best digital tool supporting the relationship, to benchmark companied with the main competitors and also to find interesting solution for driving the change. Specifically, the developed framework is an "incremental innovation" related to the architecture of the model which describes the attributes that drives the fashion companies' choices in undertaking and modeling their digitalization path. On the other hand, the study of e-collaboration adoption, represents a "disruptive innovation" related to output of the framework architecture. Quantitative results have been further strengthened through the analysis of three practical case studies: Loro Piana, Dolce and Gabbana and Moncler. The most relevant source of data has been represented by the interviews, a questionnaire, past Observatory's researches. It has been demonstrated that most advanced form of e-collaboration – strategic e-collaboration - in the fashion sector is realized when there is a high level of trust, communication , power and vision - and at the same time a high level of Supply Risk - concerning all the risk factors affecting the relationship between Fashion Houses and Labor suppliers-. Moreover, it has been demonstrated that, not in all the situations, E-collaboration adoption is the best decision: the choice must be taken, connecting the Strength of the relationship and the level of Supply Risk, regarding the relationship in the specific industry. In addition, in the attributes' design process it should be considered not only the aspect of

internal efficiency, but also the overall strategic objectives of the specific relationship. The model gives a great contribution in the literature focusing on the specific characteristic of the fashion sector that influence the adoption e-collaboration among actors. It is also the first time that e-collaboration is studied in this field, considering a group of up-to date main technologies and practices adopted in the industry.

EXECUTIVE SUMMARY

i. Purpose of the study

This thesis has the ambitious goal to investigate and assess the possible connection between Fashion Companies and their choice to implement E-collaboration with Labor Suppliers. The potential influence of e-collaboration on managing Supply Chain is going to be studied through the definition of a theoretical framework, which aims at synthetizing and modeling the companies' digital tools needs, by the identification of the major attributes relates to the e-collaboration implementation. The project is, therefore, explorative because there is the intention to generate an innovative framework. The research also provides strong empirical consequences, because the application of the framework is based on specific literature review and the empirical cases of the Italian Fashion Industry. Furthermore, the aim is to give strength to the empirical results through the analysis of three practical cases on Loro Piana, Dolce & Gabbana and Moncler. Stating from the literature review, it has been possible to identify specific research innovative topics, enabling the definition of the main research question:

"Is it possible to identify the best strategic digital tool to support Fashion Houses and Labor Suppliers' relationship in the Fashion Industry?"

The term Fashion refers to "a prevailing custom or style of dress, etiquette, socializing", it suggests something that is transitory that reflects a particular state of emotion, research for innovation, and it must be distinguished from the term "apparel" that is linked to the tradition, the static idea of the classic item of clothing. The two terms both focus on clothing, however they have completely different meaning and they are addressed to different typology of customers. "Fashion items" are realized in a short time window with very risky procedures. They are interesting for someone who follows the hedonic need of buying something amazing, due to the intrinsic emotional content. The "Apparel items", instead, are realized with normal and static processes, and they have functional meanings. As reminded by the previous definition, the Fashion industry must be analyzed with all its specific characteristics that makes it charming: inspiration and ideation are the feelings' dynamics followed during the product creation. In the last years, Fashion industry deal with many challenges and, for this reason, the way products are manufactured inevitably changed: companies realize, produce and commercialize items managing great product varieties and short life cycle. The complexity, that characterized more and more the fashion sector, is a feature that introduces point of reflection. The high complexity of the Fashion sector is managed by specific Supply Chain models that

want to protect Companies from uncertainty and risks, regarding both the demand and the supply side. Obviously, the main challenge is gaining value through supply chain management, allowing to respond quickly, efficiently and with flexibility to demand fluctuations (Schiraldi & Battista, 2013). To pursue this important objective technological innovation and outsourcing strategy have become crucial, allowing improvements in efficiency and effectiveness in managing physical flows, information and financial, (Patterson, Grimm, & Corsi, 2003). Alongside the productivity gains, the changes that new technologies can entail, in the relationship structure between suppliers, producers, distributers, intermediaries and final customer and in the companies' strategic choices, are extremely significant. Thus, for a Fashion Company is crucial to acquire the awareness related to an effective and efficient choice of E-collaboration tools among external partners. Furthermore, identifying the major attributes related to the E-collaboration adoption and the solution for the different outsourcing situations, the model is an instrument with high potentials for Companies that are developing e-supply chain strategies.

ii. Extant Knowledge

The research challenge is to identify the Italian Fashion companies attributes that influence the adoption of e-collaboration, between Fashion Houses and Labor Suppliers. Even if in literature, many researches have tried to investigate which factors, positively or negatively, influence the adoption of e-collaboration, there is no synthetic and exhaustive model specific for the Fashion Industry. There is a lack of an effective comprehensive study able to provide a model which includes all the major factors influencing the e-collaboration adoption, (Chong & Ooi, 2009). In addiction (Chan, Chong, & Zhou , 2012) suggests that it is important to collect data from developed nation, considering one industry at time. Thus, there is room for production of new knowledge related to the topic of E-collaboration adoption in the Italian Fashion Supply Chain. Moreover, the interviews of the Fashion companies highlighted a critical deficiency related to the influence of e-collaboration adoption between Fashion Houses and Labor Suppliers. In addition, the literature review focuses the attention on *Kraljic's Portfolio Model*, that was used to reflect over the main strategies used by the firms, to manage the supplier-base, taken into consideration the Supplier Risk and the Importance of Purchase. In the original model there are practical implementation problems, criticized by many researchers: the model focuses on given 'items' and not supplier relationships. For this reason, considering the specific e-collaboration

technologies as the output of the research, the focus moves toward the definition of the Fashion Supply Chain Risks and Relationship attributes, that could influence the choice of the adoption of E-collaboration. The correlation between Supply Risk a (Schiraldi & Battista, 2013)nd Relationship attributes impacting the E-collaboration tools adoption is objective of past researches: (Chong & Ooi, 2009) (Michelino, Bianco, & Caputo, 2008) (Garcia-Dastague & Lambert , 2005), (Chatterjee & Ravinchandran, 2004).The purpose of this research project is to target the interest of Companies' managers, administrators of Fashions associations and Third parties providers, who are making strategic decisions in order to increase competitiveness of their realities. Furthermore, this research aims at providing an innovating approach to study the broad Fashion Industry in terms of e-Collaboration. Therefore, it could be of interest for researchers in the fields of Fashion Industry, who are contemplating what kinds of potential extensions of this project can be developed. For all the above mentioned reasons, the research question can be translated into one main research objective: *"Developing a holistic framework to identify the Fashion Houses – Labor Suppliers 'strategic digital tool' that best fits with the characteristics and the aims of the relationship".*

iii. Design and methodology

In order to answer to the research question, it has been decide to develop, implement, and validate an innovative holistic framework. The research objective has been further deployed into three main sub-objective:

- *Research Question N.1 – What is the E-collaboration adoption level in the B2B relations in the Fashion Industry?*
- *Research Question N.2 – What are the factors that affect the e-collaboration adoption, between the Fashion Houses and Labor Suppliers?*
- *Research Question N.3 – Which are the optimal technologies to be adopted for the specific combination of the factors?*

To answer the Research Question N.1

The contents and main findings of the work are reported in ***Section 2***, and they touch the following points: analysis of the actors of the Fashion Supply Chain; digitalization perspective

in B2B Relationships; the economic perspective of Fashion Supply Chain; the main characteristics and challenges of the Fashion SC and the main Fashion Supply Risks.
In addition to a deep literature analysis**,** Interviews to the Fashion Supply Chain experts and technicians are the main contributions to the successful realization of the whole research. The interaction with them gave the research strong knowledge both for the problem setting and the problem solving process. The selection of the exponent of the company was focused on the main experts from purchasing or IT department in order to rely on precise information on the supply chain structure and on the tools to support the transactions. After each interviews, an overview of the Company interviewed has been implemented, reporting two main aspects: the structure of the supply chain and the main digitalization projects implemented, with their benefits and criticalities. This Research Question was answered with the contribution of Politecnico di Milano - Observatory of *"Fatturazione elettronica e ecommerce B2B",* in a project with the aim to investigate the level of adoption of digital tool to support the processes inside the Fashion supply chain.

To answer the Research Question N.2 and N.3
The employed methodology encompasses specific activities, belonging to two different phases:

- Problem Setting
- Problem Solving

The "Problem Setting" phase represents a fundamental stage of the research. First of all a deep research of the already known and used sourcing strategies has been performed. The model is based on a re-interpretation of Kraljic's Portfolio Model, with an innovative focus on the Relationship attributes and Fashion Supply Risk, as discussed in the previous paragraph. For these reason the macro-variables, under study, can be translated into: Strength of the Relationship; Fashion Supply Chain Risk. Therefore the goal of the problem setting is to detect and classify all the already known Strength of the relationship attributes, related to e-collaboration adoption choice, and the main Fashion Supply Chain Risk, in order to develop an effective model describing the extant knowledge. At this step, the problem setting encompasses the two following activities:

- Literature classification;
- Choice attributes rationalization.

The “Literature Classification” enabled the recognition of the Fashion Supply Risk’s and Relationship Strength’s micro-variables, affecting the Companies’ e-collaboration adoption. These variables have been classified and grouped in order to build up a rationalized model. Indeed, the “E-collaboration drivers rationalization” phase allows to define micro-variables: these represent the output of the problem setting.

The “Problem Solving” phase integrates the output of the Problem Setting with the empirical research, in order to elaborate the answer to the research question. Problem solving activities have been structured into:

- Theoretical framework design;
- Empirical implementation;
- Interpretation and validation.

Once defined the macro and micro variables, “Theoretical framework design” is aimed at formalizing the final theoretical framework from a qualitative and quantitative perspective. First of all a deep literature research is performed to find empirical correlation among attributes and the final objective, e-collaboration adoption. Each qualitative framework can be considered appropriate and effective only whether it can be empirically implemented in an effective way, (Nilsen, 2015). Following, the qualitative theoretical framework has been transformed into a quantitative tool for empirical analysis. In this part of the project, the aim is trying to define a dashboard of KPI, in order to classify the companies that has been interviewed, with a scale of measure univocally defined. In order to defined the scale of measure a literature analysis has been conducted. During the “Empirical implementation phase”, each company is positioned in the framework, considering the impact of the different variables. The research moves ahead considering the technologies used by the companies that are positioned in the same area of the graph. The definition of relevant clusters is the output of this phase. The “Interpretation and validation” phase, in accordance with the empirical evidence that has emerged, aims at building a model to suggest the correct digital tool to support the communication between the business partners and to validate the model through three Case Studies.

Structure of the research project:

In order to address all the before mentioned objectives, the thesis has been divided in 6 main Sections plus the concluding chapter:

- Section 1 – Literature analysis. The second section exhibits a complete overview of literature contributions related to:
    - The introduction to the concept of Supply Chain Management;
    - The introduction of the concept of E-Supply Chain;
    - Practices, technologies enabling Supply Chain collaboration;
    - Factors enabling e-collaboration.
- Section 2 – Fashion Industry. The third section is focused on:
    - The description of the Fashion Supply Chain, considering main actors and characteristics;
    - Main risks related to the Fashion Supply Chain;
    - Economic analysis along the FSC.
- Section 3 – Methodology. The fourth section describes the methodology employed to pursue the research objectives and to develop the innovative framework.
- Section 4 – Framework. In the fifth section, it has been described the developed theoretical framework, from both qualitative and quantitative perspectives.
- Section 5 – Empirical Implementation. The sixth section exhibits the practical implementation of the designed framework to Fashion Companies, with the definition of the main clusters and solutions.
- Section 6 – Interpretation and Validation. The seventh section describes how the major findings of the implementation process have been validated, through the analysis of Loro Piana, Dolce & Gabbana and Moncler case studies.
- Section 7 – Conclusions and Recommendations. The last section of this thesis clearly exhibits the major findings obtained and demonstrated through this research project.

Structure of the research project: a methodology perspective.

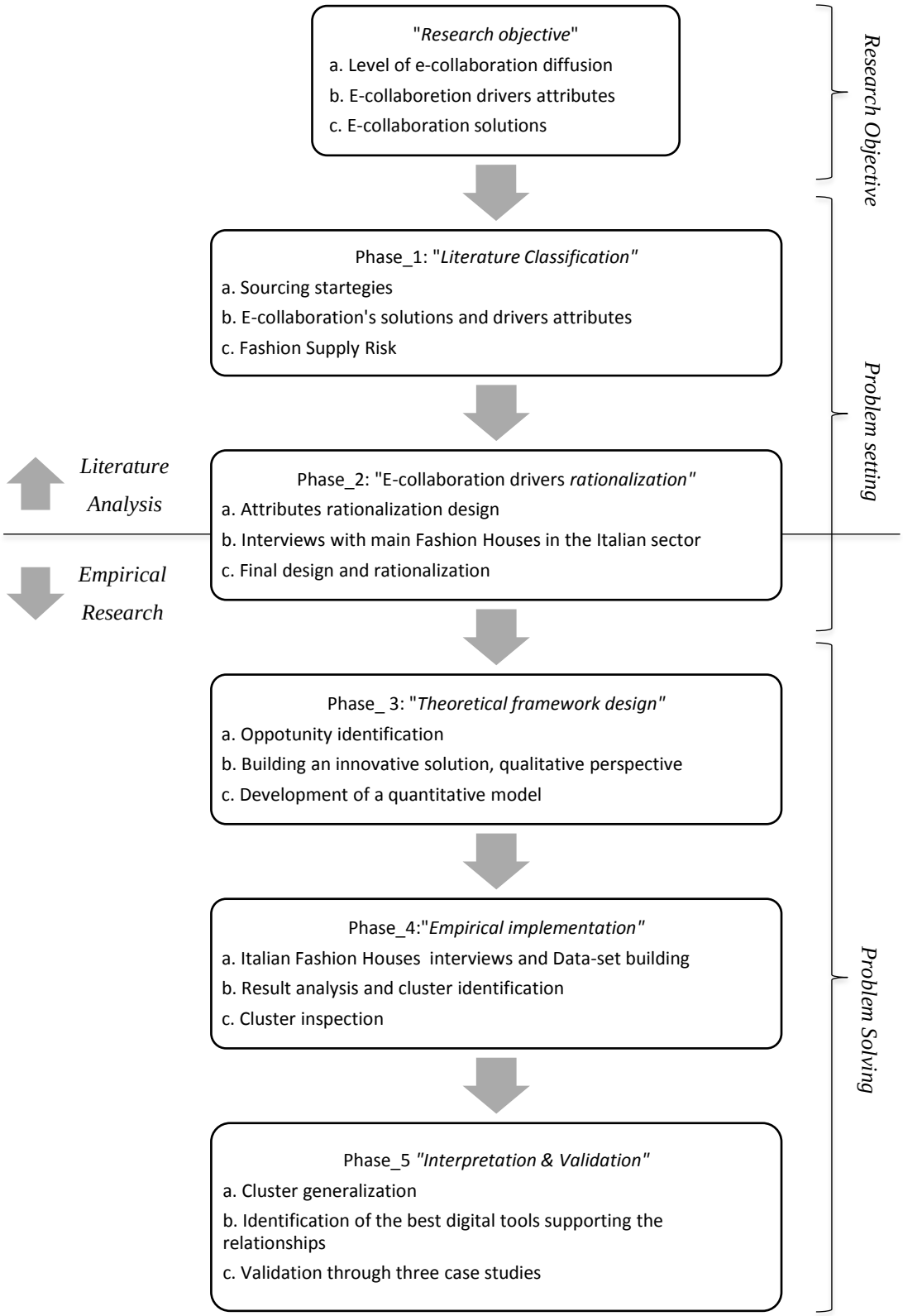

Figure 1 - Structure of the research project: a methodology perspective.

iv. Findings and limitations

The Italian Fashion sector is featured by complexity and dynamism. The complexity is originated by the distribution of companies in small districts, that act as small systems. The dynamism arises by the trend of Italian Fashion companies to overcome the national barriers, creating articulated and worldwide supply networks and fragmented production activities. The research focuses over the main e-collaboration strategies adopted by companies in the Industry under study. To undertake this objective a deep literature analysis and interviews to the Fashion Supply Chain experts and technicians are the main contributions to the successful realization of the whole research. The results found are significant: many important Italian Fashion Houses are adopting more integrative and collaborative strategies in the supply network. As a consequence, the introduction of digital tools to support supply chain processes has become crucial. Firms have understood the benefits pursued by the implementation of ICT, in business to business communication. The "digital transformation", that the Italian Fashion companies are undertaken, is not easy due to the intrinsic characteristics of the industry. Despite the major criticalities, nowadays interesting projects of digitalization have been realized. One example is the adoption of Web Portals to connect firms with their network of suppliers. Web portals can have different functionalities: from a simple support over the normal order–cycle activities to more advanced features, abled to facilitate the process of commissions assignment. The most advanced form of Web Portal allows the exchange of models for future collections, in order to receive immediately the suppliers' feedbacks, concerning the feasibility of the production. Upstream, the Edi utilization is still limited, due to the high implementation costs, that prevent small suppliers to adopt it. On the contrary, downstream it is one of the main exchange instrument, used for active and passive invoices and sales data, between Fashion House and main international wholesalers. Finally Web Platforms are also exploited in order to be closer to the final market. Indeed, The systems are used to exchange the inventory level data, in the main shops, to get insights about the customers' preferences and information about the most requested items.

Considering the new emerging "digital interdependence" attitude of Fashion firms, the research moves on, focusing on a slice of the supply chain where "e-collaboration" is mostly spread. For this reason, the attention was posed over the specific connections between the Fashion Houses and their strategic partners: the labour suppliers. In particular, considering the main gaps in literature, firstly the research focuses the analysis on the main factors, that characterized the phenomena diffusion. The implementation of the "Theoretical framework design" phase leads to

the identification of the main factors that influence the decision to undertake a collaborative relationship, and have positive correlation to the choice the digital tool introduction. In particular Kraljic's model has been the main starting point of the reasoning. Specifically, it has been possible to identify through a deep literature research, two main macro-variables attributes: "Strength of the relationship" and "Supply Risk". Indeed, there is a clear distinction between the strength of the suppliers' relationship and the risk concerning the designed network of suppliers. As a consequence, they are influenced by different type of variables; all of them has been discovered through a deep literature analysis focused on both the two points of reflection. The description of the main variables, which have been included in the model, and their relationship with e-collaboration adoption, have been displayed in the following *Figure 2*:

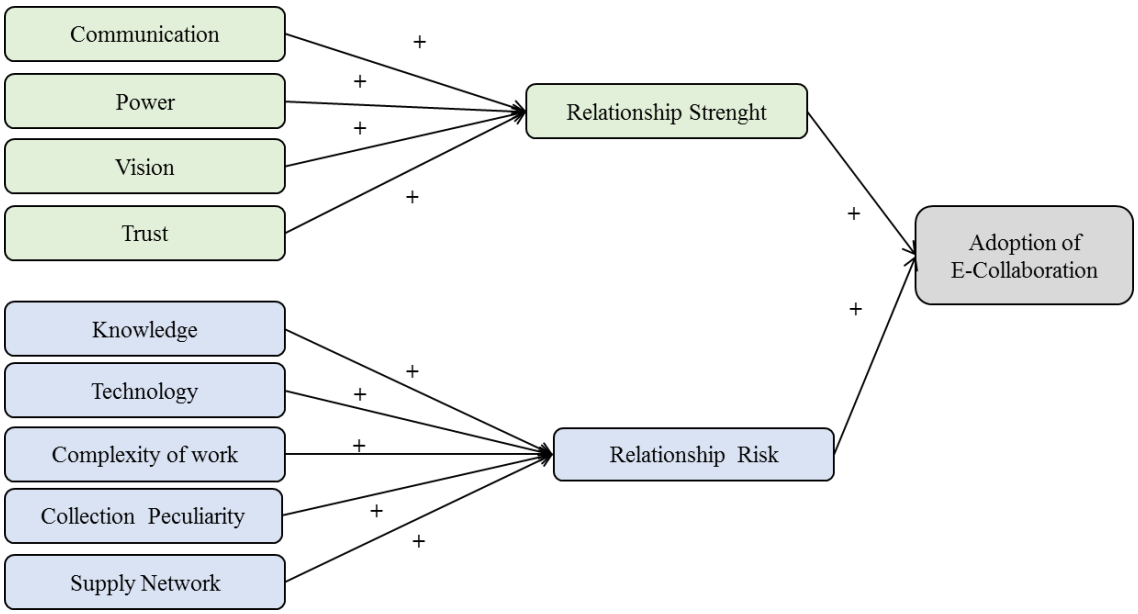

Figure 2 - Problem Solving Output.

The framework expresses the e-collaboration adoption behaviour as Relationship Strength and Relationship Risk. The first macro-variable group expresses how partners overcome the organizational silos, combining efforts and resources to reach a common objective. The second macro-variable is focused on the risks that could arise in the specific Fashion House-Labor Supplier relationship. The major findings of the research highlighted that the former take into account the environment of trust, respect and communication, the latter all the risk factors that

affect the relationship between Fashion Houses and Labor suppliers. The "Empirical implementation" phase enabled the research project to achieve the first result related to the positions in the developed framework of the main Italian Fashion Houses. The main findings is the creation of clusters of companies that have similar characteristics in the collaborative processses implemented.

The "Empirical implementation" phase has been also aimed at verifying that the companies in the same clusters are also characterized by the same typology of digital tools adopted, in supporting the interactions with the main Labour suppliers. From the interviews with experts and the results of the implementation of the developed framework emerges that the variables are influencing the e-collaboration needs. In particular, a further increase in the Supply Risk determines the need of a wider control over the network; while a further increase in the Relationship Strength determines an adoption of advanced tools to support transactional and collaborative processes. The results were very interesting, because there are a strong similarities, and basing on that the research proposes for each area of the framework the best and more suitable technological support tools.

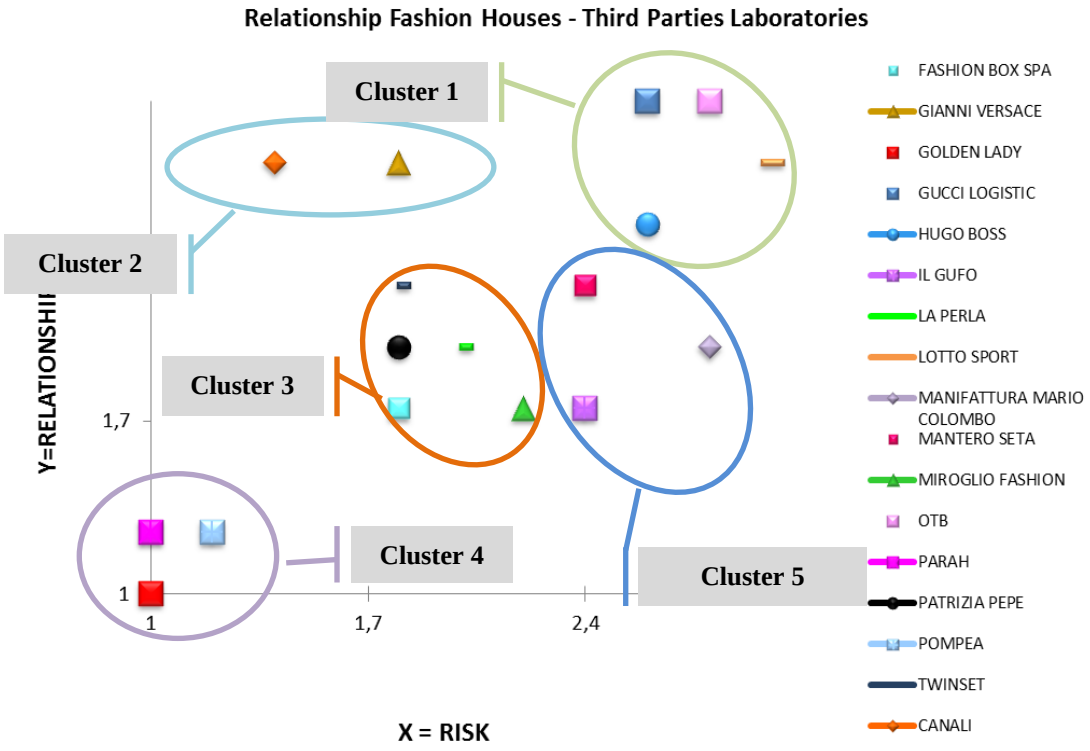

Figure 3 - Cluster identification.

"Empirical implementation" of the theoretical framework has contributed to get some insights: the stronger is the relationship, the advanced are the tools to support the exchanges. Long term commitment and trust are the starting point for the adoption of more sophisticated communication system. The level of risk determines the necessity to increase the visibility over the supply chain by an exchange of more structured information, that enables integrated planning and joint control over the inventories.

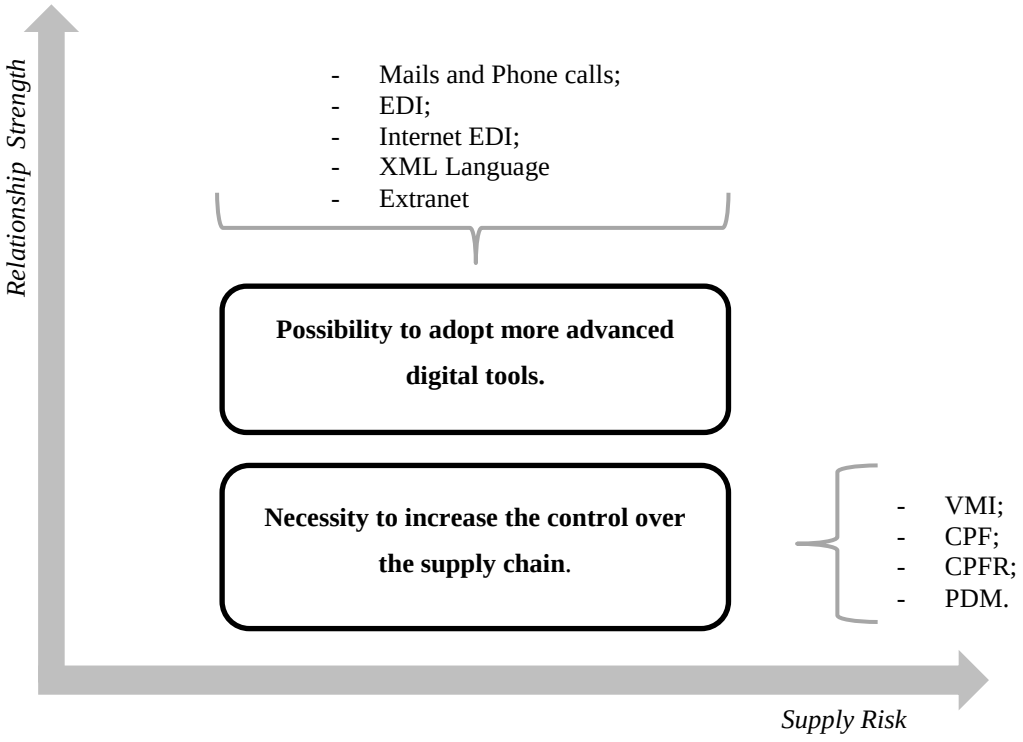

Figure 4 - Brief representation of the Solution.

However, a further investigation of the topic through the "Empirical implementation" phase highlighted that not all the areas of the framework are populated by companies due to the small sample taken into consideration. Thus, in order to completely and effectively answer to the research question it has been necessary to deepen the analysis and to identify the mechanism through which digital tools can enable the best suitable e-collaboration process among partners.

Strength of the relationships			
	Development of a specific standard and procedures to use with the stabilized suppliers' base. The strength of the relation leads to the realization of a specific language XML to use in the application.	Use of EDI system and more structured web based portal. Necessity to coordinate the execution activities: order cycle but also production processes, and level of inventory. The system can also allow communication the progress status of manufacturing	Web platform integrated with the internal ERP : -to control the advancement of the production; -allocation of the capacity; -Joint product development; -Joint forecast -Joint production planning;
	The communication are based on simple system of communication but with an information more structured thanks to the increase in the strength of the relation.	Web portal with very basic functions: - such as the allocation of the order; -the exchanges of models and drawings;	Web portal with additional functions to register : -Advancement of the production; -Level of inventories; -Quality controls data;
	The main ways of communication are very simple such as : -Mail -Phone calls The activities that are controlled are execution activities.	The main ways of communication are very simple such as : -Mail -Phone calls Necessity to increase the control the suppliers process by registering milestones of advancement of the production.	The main ways of communication are very simple such as : -Mail -Phone calls Necessity to increase the control the suppliers process by advancement of the production, quality standard of the processes.
Level of risk			

Figure 5 - Solution Output.

Therefore, the "Interpretation and validation" phase has been aimed at accomplishing this further challenging analysis. The analysis of Loro Piana, Dolce and Gabbana and Moncler case studies highlighted, for each situation, the strategic importance of a good and suitable digital tool, in order to gain competitive advantage together with external partners. Although the model has been correctly validated through three case studies, it presents some limits concerning the hypothesis underling it. In particular, in the empirical analysis phase, the limited sample of the companies has prevented to statistically prove the correlation of to the e-collaboration adoption factors. In addition, the quantitative attribution of the KPI's score lacks of more structured information, that could have been made this phase more reliable.

The empirical model has positively contributed to the literature, providing a broad overview of the main digital instruments and practices adopted in the Fashion sector, supporting the strategic

relationship Fashion House-Labour suppliers relationships. The model provides also suggestions for future development benchmarking the actual position of the firm with the main competitors. It might be argued that the developed framework looks at a past perspective, so it is not able to detect future trends: it is actually true. However, it is also true that Kraljic's model, on which the research developed the framework has a validity over time due to its capability to detect any variation. Therefore, the employment of this framework, together with innovative strategic managerial approaches, together with innovation of technological tools' foresight, represents a powerful leverage to better explore the Fashion industry. Finally the research states that e-collaboration adoption, is not always the optimal solution. In detail, it should be applied whether two main condition, expressed by the macro-variables, are realized: a sufficient level of maturity in the relationship with the supplier and an high need of visibility over strategic activities conducted externally must arise.

The main advancement is related to the innovative and strong connection between the macro-variables and the solutions, aimed at identifying the best suitable digital tools supporting such relationship. Specifically, the designed framework represents two different novelty elements. First, it is an "*incremental innovation*" relatively to the architecture of the framework: it is the first research which has developed a comprehensive and complete framework including all the major variables influencing the e-collaboration adoption in the Fashion Supply Chain. Having such a complete framework enables researchers to have a complete view on the feature that Fashion Houses – Labor suppliers relationship providing an innovative contribution to enhance the past literature. Second, the study of e-collaboration, as definition of best digital tools used by companies to enable collaborative relationship, can be considered a "*disruptive innovation*", as far as there is a new component within the framework architecture. It is the first time that a study introduces the definition of the digital tool more suitable to specific collaborative relationship, in the investigation of e-collaboration adoption.

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1.LITERATURE ANALYSIS

1.1 Introduction of Supply Chain Management and E-Supply Chain

Supply Chain Management

The concept of supply chain dates back to the early 1980, as an extension of the logistic concept defined as "the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole" (Christopher M. , 1998). The concept involves all the subjects that participate to the operative processes by which the raw materials are transformed in final products and make available to the end customers not only for the purchases but for the entire product lifecycle.

The previous definitions don't take into consideration the important role of the information exchanges among the actors. (Quinn, 1997)was the first one declaring "another important element inside the supply chain are informative systems necessary to monitor all these activities". In the years, the concept of supply chain has been criticized by several authors because its simplicity. (Lamming , Johnsen, Zheng , & Harland, 2000) underlines the fact that the definition makes the chain as something linear but the reality is a complex network of interrelations between the company and the suppliers.

(Cox , 1999)is also adding the second criticism: not all the actors in the supply chain are willing to align themselves for the sake of a common objective; this fact is realized only when the focal company has got a relative power over the network or when the actors are very interrelated.

(Mentzer, et al., 2001) identifies three degrees of complexity of the supply chain:

- *Direct supply chain*: it a linear supply chain consisting in a consumer, supplier and a company;
- *Extended supply chain*: it considers the second tier of suppliers and the second tier of consumers;
- *Ultimate supplier:* it includes a third level of suppliers and third level of consumers, all the organizations involved in all the upstream and downstream flows of products, services, finances, and information from the ultimate supplier to the ultimate customer.

It is important to introduce the concept of supply networks, in order to take into consideration the complexity of the reality. (Johnsen, 2014) defines it as "sets of individual interconnected supply chains. Whether supply chains are usually analysed in relation to specific product or service offering, supply networks relate to larger product families or entire organizational supply networks". Maintaining the network perspective can simplify the process of obtaining synergies among the different suppliers and a better coordination of the activities. At the same

time, it can reveal also possible threats for the company when one supplier, for different families of products, is interconnected with the competitors limiting the sharing of knowledge.

According to (Sianesi, 2011) (Williamson, 2008)different factors have brought the companies moving the attention from the internal production to the synchronization of the activities upstream and downstream of the company:

- *Evolution of the consumers:* customers are even more demanding and the objective of the market is trying to focus even more on them, in terms of variety of the offer, service level and time to market.
- *Globalization:* the creation of even more wide market that can't be standardize because of the particular cultural differences, creating an additional element of complexity.
- *Delocalization of the supply base and production facilities:* this phenomena is one of the main consequences of the globalization, the necessity to move the production near the final market in order to be faster in serving it.
- *Outsourcing trend:* the necessity to refocus on core activities, in order to improve them leaving aside the non-core to the suppliers, that have more expertise to perform them.
- *The increase of uncertainty* both on the demand and supply side that has lead an increase in the difficulty in the planning activities.

The make or buy decision

The word "Outsourcing" is used to indicate the recourse to external resources generally functions or activities outside the organization. The strategy to contract externally is a cautious choice to take. It needs to balance the trade-off between the desire of new innovative processes and the level of risk, considering the possibility to lose part of knowledge with outsourcing. Different models have been proposed in the literature to support the externalization choice. First of all, (Williamson, 2008), through the transaction cost economic (TCE), proposed an economic perspective in driving the choice. The TCE poses the attention in particular over transactions costs, considered as the expenses necessary in buying goods, services or part of the production and the costs necessary for managing the entire process of order. In addition, the theory takes into consideration other two important factors in determine the decision: the degree of *asset specificity*, the investment required to make the supplier perform a specific task, and the *opportunism risk*, the behaviour of the supplier that reveal part of reserved information or the fact that it performs less than agreed in the contract. Increasing the asset specificity, the transaction costs and the risk included in the relation will rise, for this reason the theory

suggests to recur to vertical integration. TCE was criticized by several authors considering the extreme focus over the short term objective and the exclusion of factors influencing buyer-supplier relationships that can mitigate the profit driven attitude of the actors. As emerged the outsourcing decision must be separated from the simple cost advantage objective, that can be easily realized delegating the production phases to the supplier, focusing on the short term perspective rather than long term perspective. The (Arnold, 2000)*'* model proposes an interesting way to reflect over the outsourcing decision: delegating to the suppliers the management of core activities is more risky, rather than delegating the non-core or peripheral ones. The Resource Based View theory (RBV) focuses the attention over the activities that the company uses as source of competitive advantage. It suggests to realize internally those activities that are core for the company. (Leonard-Barton , 1992) identified one of the main limit of the model, it creates rigidity in the firms, preventing from finding value outside thier boundaries. For this reason, the theory of dynamic capabilities has been proposed: "Dynamic capabilities are defined as the ability to integrate, build and reconfigure and external processes and competencies to address a rapidly changing environment, where the ability to maintain and adapt these capabilities is the basis for competitive advantage" (Teece , Pisano , & Shuen , 1997)*)*. The theory allows the firm to reflect on the possibility to change the core activities and to catch important stimulus in the environment, considering also future perspectives. Finally to include all this important insights, the *Extended Resource Based View* (ERBV) has been introduced by (Dyer & Singh, 1998). The theory states Trust is one of the main important element to create robust relationships with suppliers, and to create sustainable environment. "Relationship capability" is the correct management of the network of suppliers and firms can obtain strategic value from it. Finally, *the interaction approach,* developed by the Industrial Marketing and Purchasing (IMP), stresses the importance of finding sources of competitive advantages in the suppliers, as suggested also by RBV.

The explanation of previous theories is important for the aim of the research. It allows to understand the main drivers that bring companies to extend their boundaries. Indeed, the increasing of the complexity is justified by the need of flexibility to overcome the internal rigidity and the rapid change in the environment. It is important to identify the correct sourcing strategy, according to the particular circumstances, in order to exploit the outsourcing advantages.

The most important Sourcing model is (Kraljic , 1983). It considers two important dimensions: one is related to the supply market condition, the other one is referred to the strategic

importance of the item purchased. In particular, the dimension of the matrix (Kraljic , 1983) can be described as:

- *Supply risk*. It includes the difficulty in finding the suppliers for a given item, the level of advancement in the technology and the logistic costs according to the distribution of the main suppliers. The main relevant factor is the concentration of suppliers: the lower the number of suppliers the higher their bargaining power. Also the distribution is important: if the supply base is spread at international level the transportation costs will rise. Finally the higher the saturation the suppliers, related to the production capacity, the higher the risk of delays and bottlenecks.
- *Importance of the purchase.* It indicates the competitive advantage that can be pursued by the strategic purchase of the items, on the overall goal of the company. It could be represented for example by the reduction of total costs or the impact on the quality level of the final product.

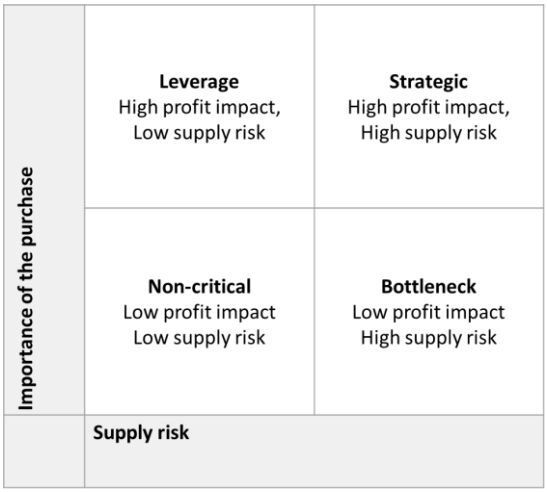


Figure 6 -Kraljic's (1983) model

Non-critical items are the ones characterized by low level of Supply Risk and low Importance of Purchase. They are standardized items or commodities. The best choice is to outsource recurring to a multiple sourcing strategy, in order to exploit the bargaining power. The relationship should focus only on the mere transactions avoiding the involvement of the suppliers, in the process of new products development. **Leverage** items are the ones characterized by low Supply Risk and high Importance of Purchase. In this case the company

should focus on the bargaining power creating dual or parallel sourcing. The dual sourcing requires to maintain one main supplier fixed and another one as backup. The parallel sourcing instead creates two relationships with the same nature. The last strategy allows to reduce and differentiate more the risk, respect the single sourcing strategy, and it increases the performances of the suppliers respect the dual ones, because it creates tension and competition between them. **Bottleneck** items have low Importance of Purchase and high Supply Risk. They are the most critical items and, for this reason, the best strategic solutions are recurring to the vertical integration or finding substitutes. In case the two strategies can't be feasible, it is likely to adopt single sourcing strategy, with long term contract. **Strategic** items are characterized by high Importance of Purchase and high Supply Risk. They have strong impact on final product quality, overall cost and companies' competitive advantage. For this reason, it is necessary to develop long term collaborative partnerships with suppliers. The model has been criticized in the literature because the two variables are too simplistic. In particular, there is an extreme focus on the item supplied and not on the relationships with the suppliers. Companies should invest resources only on those relationship that can be considered strategic and that can bring value to the firm.

(Cousins , 2002) introduced one of the most innovative model in the sourcing strategy: it focuses on the relationships rather than the items. It identifies the best portfolio strategy in terms of the main relationships with the suppliers that could be associated to partnership, in order to be supported by investments.

Figure 7 - Cousins (2002)

In (Cousins , 2002), there are two important dimension to consider: the first one "level of confidence" considers the degree of faith inside the main relationship, while the second one takes into account the level of dependency. The strategic collaboration can be realized where there is mutual dependency with a high level of confidence. In this case it is important to support the relationship for example sharing of exclusive information or engaging the suppliers in the first phase of new product development.

According to (Spina, 2008), two kinds of collaboration must be distinguished: technological collaboration, also called "co-design", and operative collaboration.
In the *technological collaboration*, the relationship between the customer and the supplier is very interconnected and the two actors share their knowledge in order to manage the new product development process. It is collocated between the mere purchase through catalogue and the sub-furniture. The purchasing through catalogue is addressed for standard goods, that the customers can't personalized or modified; on the other side the sub-furniture completely delegates to the customer the developing process. Finally, "co-design" /technological collaboration is the process in which the customer and the supplier jointly share their expertise to realize new products with low costs and with a shorter time to market.
The *operative collaboration*, according to (Spina, 2008), is the integration of the activities linked to the logistic and production cycle. The collaboration is realized by the joint coordination of activities such as the demand forecast, planning of the requirements, planning of the production, emission of the order, reception of the invoices and payment. In a continuative relationship both the actors have interest in managing them in an optimal way. To pursue this objective, it is fundamental to share the partner all the information required to optimize the production process, to avoid bottleneck, to guarantee a good quality and production level and to maintain a proper level of inventories. The level of visibility obtained by this kind of relationship requires a good infrastructure to entail communication.

In recent years, there is a strong interest in the management of the suppliers relationship to get competitive advantages. To support and enhance the relationship, the advent of digital instruments has become important. In the following section a review of the main digital technologies, supporting the relationship between the different actors of the supply chain, is being analysed.

E-Supply Chain

Technological innovation in the Supply Chain has become crucial, allowing improvements in efficiency and effectiveness in managing physical, information and financial flows (Patterson, Grimm, & Corsi, 2003). Alongside the productivity gains, the changes, that new technologies can entail in the relationship structure between suppliers, producers, distributers, intermediaries and final customer and in the companies' strategic choices, are extremely significant. In particular, in a competitive environment, where information is important, technology plays a crucial role.

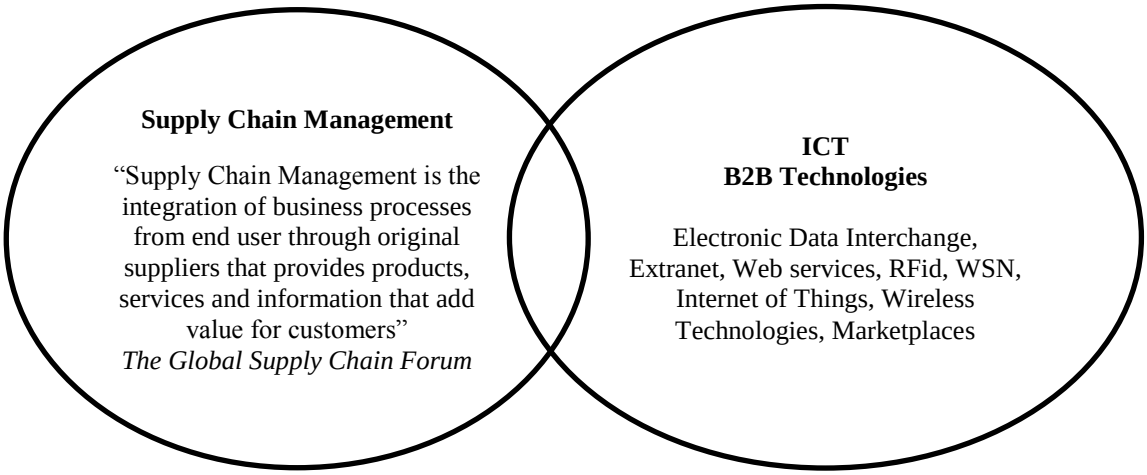


Figure 8 - Interception between Supply Chain Management and ICT B2B Technologies (MIP Politecnico di Milano).

In this way, the concept of e- Supply chain management (eSCM) was born, and it is referred to the supply chain management through the use of ICT technologies. According to (Michelino, Bianco, & Caputo, 2008), this new paradigm is the intersection of three macro-ambitions: supply chain management processes, the relationship between actors in the Supply Chain and the B2B technologies.

Figure 9 - E-Supply Chain Paradigm (Michelino Et Al.2008).

The concept of e-supply chain originates thanks to the advancement of the technologies and at the same time by the optimization of business processes by the partners integration enabled by the Internet (Pulevska-Ivanovska & Kaleshovska , 2013). E-supply chain is realized by the union of Internet and the business processes, throw the different partners with the main objective of increasing integration in order to create customer value. Information sharing is one of the main point to allow a correct integration and coordination among the actors of the supply chain. E-supply chain is an advancement respect to the normal concept of supply chain: the processes of purchasing, procurement and shipment remains quite similar but they are supported by technological tools. Different aims have generated the need to introduce electronic supply chain such as: to reduce the costs, to improve business processes; to respond quickly at the customer needs, to increase the communication with the business partner and to increase in the level of outsourcing for all the activities that are not source of competitive advantage.

The introduction of e-supply chain allows:

- *Information sharing:* the provision of real time data about the sales as main factor for improving the forecasting and to reduce the risk of stock out, decreasing the bullwhip effect. The bullwhip effect increase the level of uncertainty inside the supply chain with the main outcome of creating fluctuations inside the supply chain.
- *Knowledge sharing*: the business partner can discover and build common models, in order to support the planning and forecast phases.
- *E-commerce:* the use of the technologies to support the transaction between business partners.

The introduction of technologies inside the supply chain in the short term, even if the investment is huge, can't create an immediate competitive advantage. Nevertheless it is a first step to improve processes and to speed up the information sharing.
According to (Bertelè , Rangone , & Mainetti S. , 2004) the concept of e-supply "a company and all the main business partners that catch the advantages linked to the joint planning and joint processes management creating the so called "extended enterprise".

The concept can be further split in two different settings:

- *E-Supply Chain Execution* includes all the necessary operative activities to support the order cycle that includes all the logistic, administrative and accounting phase. It includes day to day decision and practices, with low strategic impact on the overall strategy.

- *E-Supply Chain Collaboration* includes collaborative activities and decision to support the joint activities among partners, like joint production planning, strategic sourcing. The decisions have long term impact, and they are part of the company strategy.

In the following section the aim is to analyse deeply the previous concepts.

E-supply chain Execution

The execution process can be described considering the different sub-phases (Bertelè , Rangone , & Mainetti S. , 2004). *Pre-sales support* is the phase of sharing information necessary to complete the order emission such as: the availability of production, the capacity availability, the service level provided, the time necessary to complete the commission. *Order emission phase* involves the activities from the order creation with the list of bill of materials until the order confirmation and condition set by the supplier. The *Logistics phase* is characterized by the management of the logistic activities from order reception, to the goods preparation by the picking until the management of delivery. *Administrative cycle phase* is featured by the emission of all the documents associated to the transaction and *Post-sales support* includes all the activities concerning to claims, maintenance of the products, technical support and assistance.

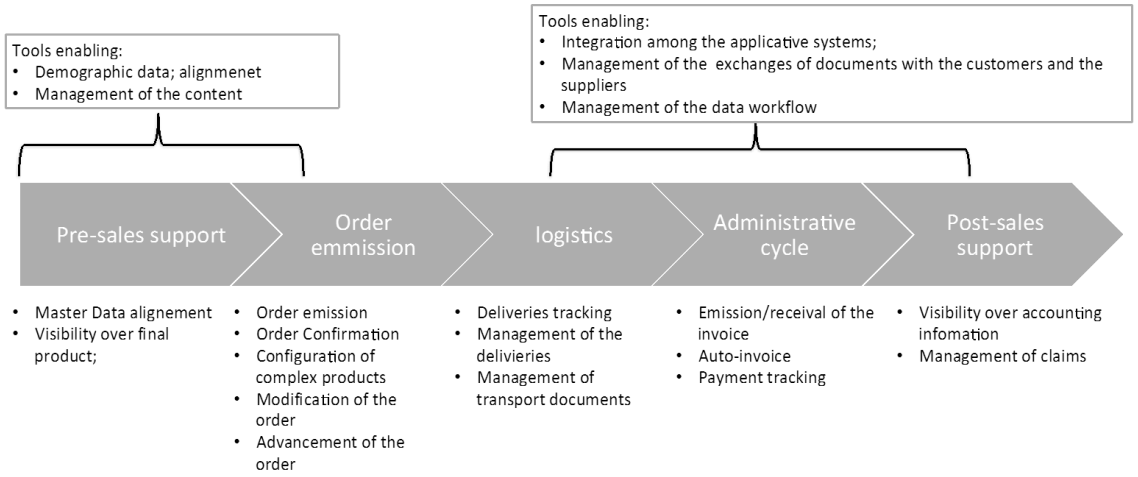


Figure 10 - Execution process phases (re-elaborated version Bertelè et al 2004).

The term E-supply chain execution encompasses all the previous processes supported by a technological tool. It makes easier the information and documents flow, the integration between the application systems between the business partners and the exchanges of documents among customer and suppliers. In the ***Figure 6*** is possible to notice also the main functionalities associated to the digital tool for each particular phases of the execution process.

According to (Bertelè , Rangone , & Mainetti S. , 2004) the main technological tools can support:

- *Restricted covering of the order cycle*: only basic documents of the order cycle are exchanged such as orders and invoices.
- *Extended covering of the order*: additional documents of the order cycle are exchanged such as orders, orders confirmation, shipping notification, transportation documents, invoices and payment notification.
- *Complete covering of the order cycle*: all the previous documents are exchanged with additional automatic alignment of the data of the products, sales condition and catalogues.
- *Extended covering also to other operative processes*: the solution support also some complementary processes of the order cycle in the pre-sales phase and in the post-sales phase.

E-supply chain collaboration

The process of collaboration is characterized by different activities. The first one can be described as *Monitoring and control over the supply chain* consisting of information sharing, such as sales, production capacity, the main metrics to evaluate non regular events. Another important aspect of e-collaboration is the *Collaborative management planning activitie*s among partners to establish the demand forecast, the promotional activities, in order to decide the level of inventory and, or eventually, the application of CPFR (Collaboration models to support the decisions). The *Collaborative management of development of new processes* regards the sharing of the main technical documents and the workflow monitoring. Finally the *Co-marketing* is the sharing of the main marketing plans such as the price level, customized offer to the client. The main technological tool to support the previous described activities must allow the exchange of digital documents such as: technical drawing in Cad format, particular data related to the planning processes or the exchange of data related to marketing and communication processes.

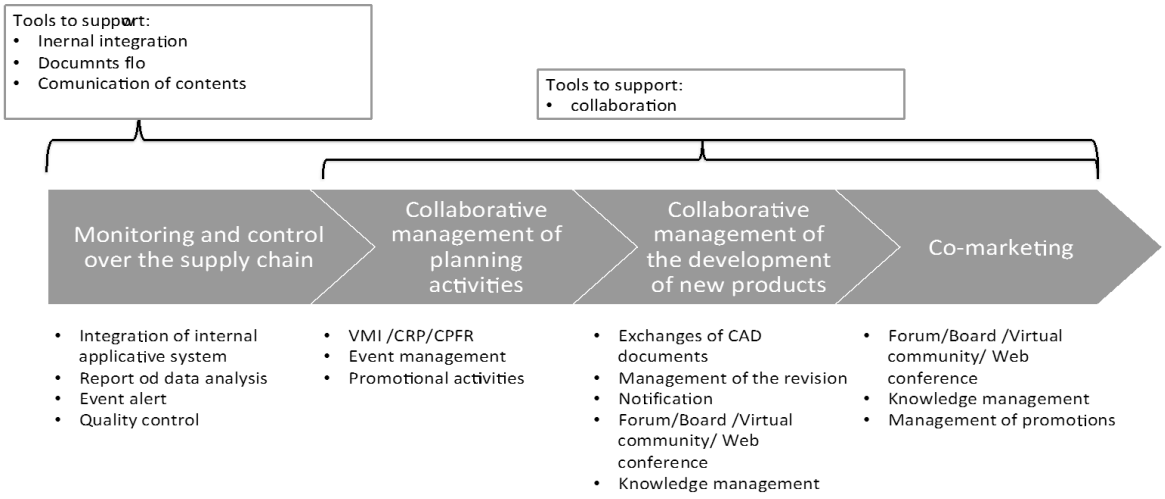


Figure 11 - Collaboration process phases (re-elaborated version from Bertelè et al 2004).

The digital tool can be classified according to the main functionalities:

- *Data support*: the solution supports the exchanges of input data (sales, inventories, production advancement, technical data..) and output data (forecasting plan, production plan, drawings, cycle of work).
- *Visibility support*: the solution allows the possibility to share the main KPI to control the processes in order to make decisions.
- *Collaboration support*: the solution supports the execution of inter-company processes.

B2B and information integration

The technological development in information system gives relevance in the facilitation of information integration and, in turn, should enhance the possibility of the virtual integration of the entire supply chain. IT improves the communication and co-ordination, supporting the inter-organizational sharing of resources and competencies; managing supply chain activities by offering information about what kind of product is demanded, the warehouse availability, manufacturing processes status, and physical facilities entering and exiting the customer sites.
Internet offers a unique opportunity for supply chain operations to take a central stage in the fast online economy; but it has also an ever more importance in B2B interactions, especially in the area of supply chain integration. B2B far exceeds B2C both in the volume of transactions and rate of growth. IT controls and manages back-end operations, product design and development, procurement, production, inventory, distribution, after sales service support, and even marketing. In addition, it enables companies to communicate with business customers, suppliers, trading partners, and numerous other audiences who contribute to operating efficiency and effectiveness. The interaction is an important issue, because B2B applications are composed of autonomous, heterogonous, and distributed components but companies realize dramatic returns through efficiency improvements, better asset utilization, faster time to market, reduction in total order fulfillment times, enhanced customer service and responsiveness, penetrating new markets, higher return on assets, and ultimately, higher shareholder value, (Lee & Whang , 2000).

Drivers and barriers to adoption

Many researches in literature have focused on the diffusion of IT tools and they have studied their adoption process by companies trying to locate the factors, which influence and affect the subsequent use of these technologies. The factors that push the adoption of IT to support Supply Chain management can be divided into three categories: the literature identifies drivers linked the internal organization, the external context or the characteristics of the relationship established between the parties. However collaboration in the Supply Chain seems to be successful or failing according to the propensity of affiliate partners to share resources (for example, information, Knowledge and skills) and depending on the ability to use them effectively in an environment Continuous evolution (Fawcett & McCarter, 2008). The main reasons why members of the Supply Chain are often reluctant to share resources or are incapable of using them properly can be related to the relationship between parts or linked to the

internal organization (Ungson & Park, 2001)*;* (Fawcett & McCarter, 2008). Below, there is a resume about the main drivers and barriers regarding the adoption of e-collaboration.

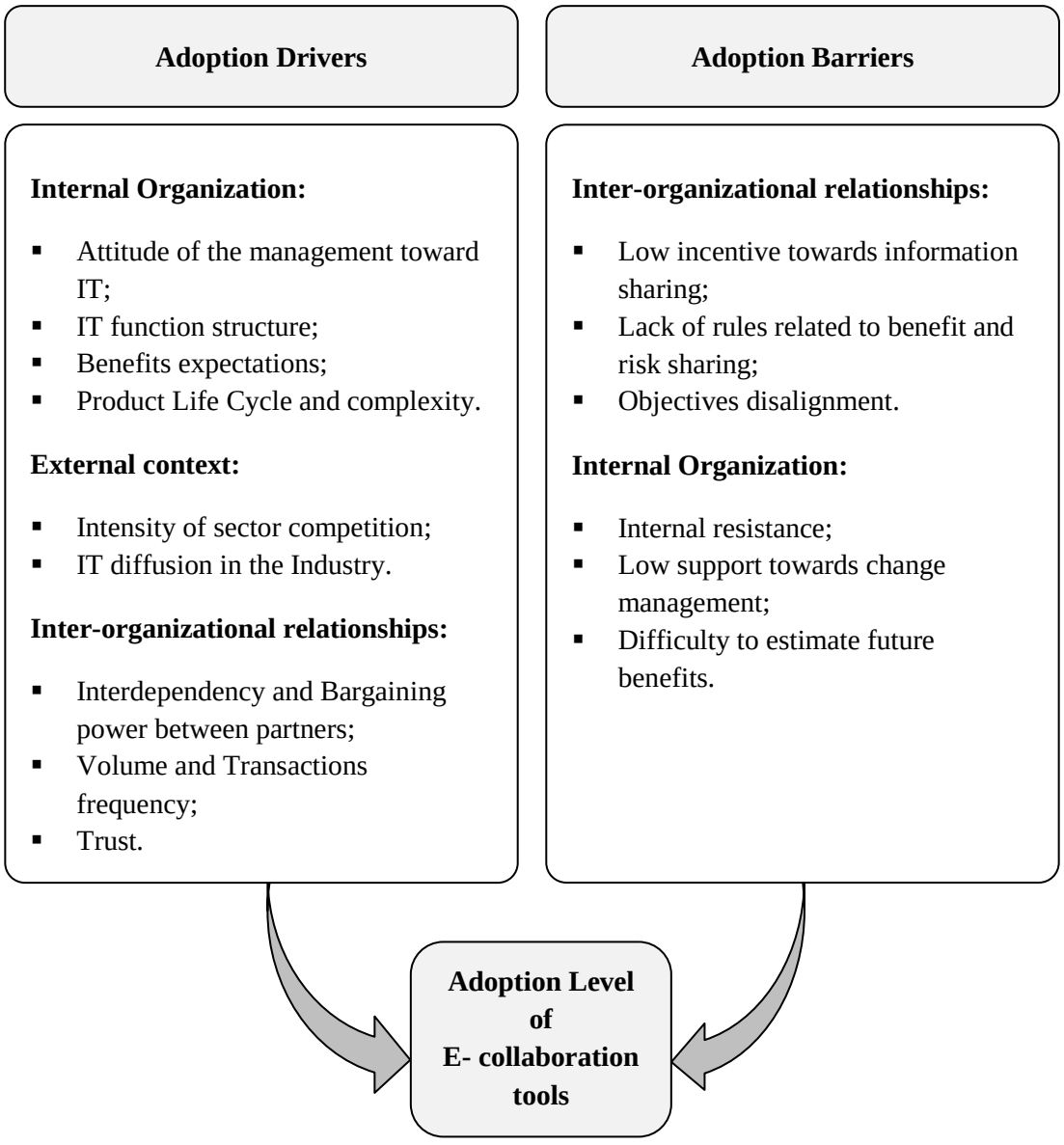


Figure 12 - Adoption Drivers and Barriers related to the adoption of e-collaboration tools.

1.2 Practices and technology enabling Supply Chain Collaboration

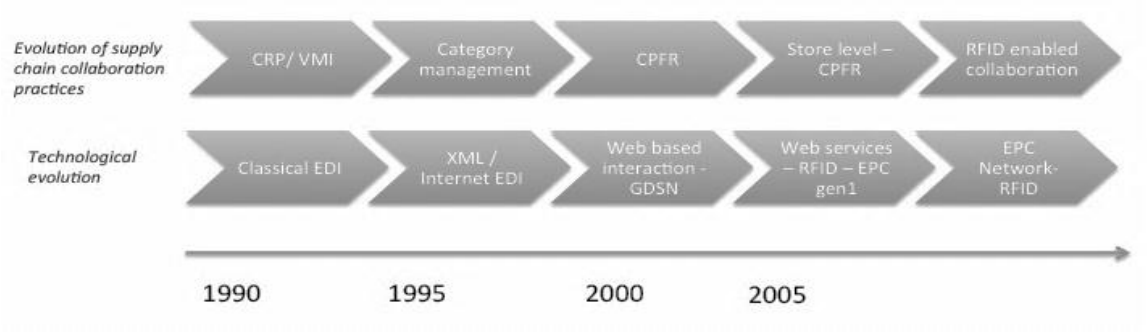


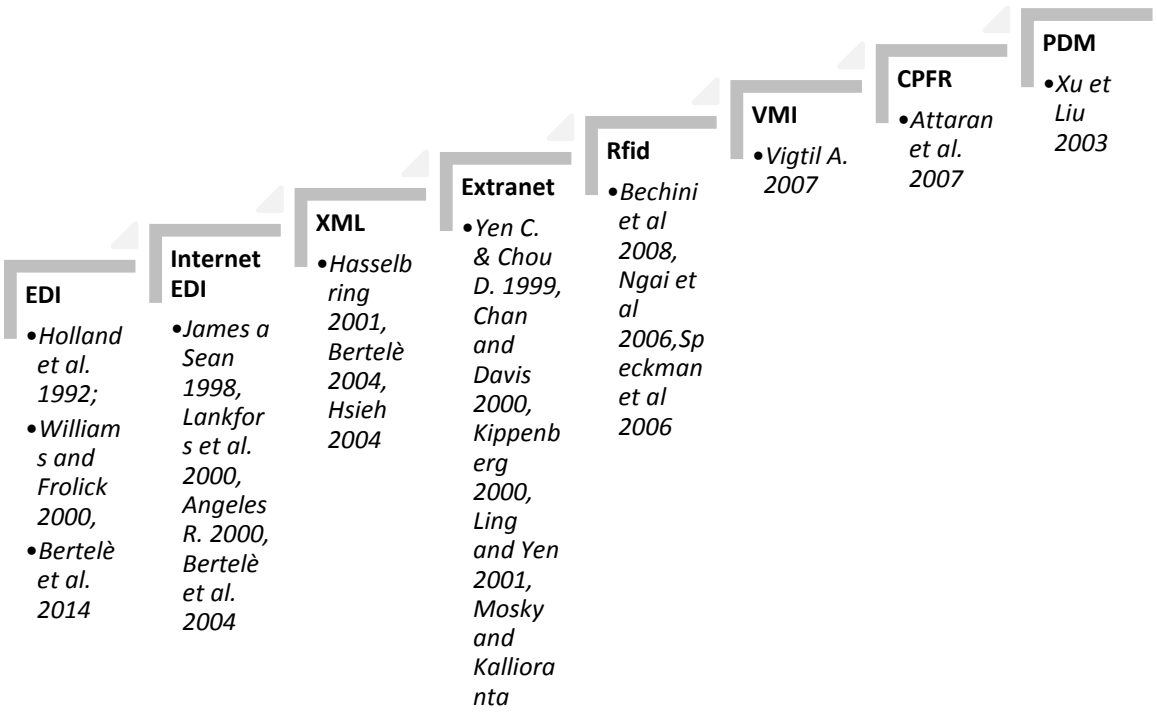
Figure 13 - Historical evolution of e-Supply Chain practices and technologies.

In this chapter the aim is to analyse the evolution of the technologies that have supported the exchanges of information allowing the collaboration between trading business partners. The evolution starts with the introduction of the EDI (Electronic Data Interchange) format to swap simple data about the quantities of the order such as the Continuous Replenishment Program (CRP) or Vendor Managed Inventory (VMI). The former is based on the establishment of the joint inventory planning basing the policy on historical data about the demand. The latter is a technique that has its origin in the late 1980s and consists in the suppliers that assumes the responsibility of the management of the customers' inventory such as the level of stock in the main warehouse.

The necessity of increase the level of collaboration by the introduction of more complex practices has brought the need to go ahead with the functionalities of the technology. For example, Collaborative Planning Forecasting and Replenishment (CPFR) permits the joint planning based on the forecast of the demand.

The more complex practises enable small partners to integrate themselves, with cheaper investments, using digital tools easy to use and to understand, such as the XML format, Internet based platform and RFID technology (Pramatari , 2007).

In the next paragraph the main Technologies and Practices are described in detail, following the order below:



EDI - Electronic Data Interchange

Electronic data interchange "process of computer to computer, business to business data transfer of repetitive business processes involving direct routing of information from one computer to another without human interference, according to predefined information formats and rules", (Holland , Lockett , & Blackmann , 1992). From the definition the main characteristic are clear: it is an application-to-application solution that allows to connects information systems of different companies without the human intervention. Edi is a standard format that is recognized worldwide and the integration is conducted thanks to the data, while the communication is realized by dedicated suppliers called (VAN: Value added network), (Bertelè , Rangone , & Mainetti S. , 2004). The origin of the technology dates back to the early 60' but the complete realization is not linked to particular events but a progressive evolution realized thanks to the advancement of the technologies, the infrastructures, application and digital managerial practices. The Edi format is considered complex because of the absence of use of meta-data to explain the different documents, it can contain the entire dimension of the messages. The format is characterized by the positional notation where the data spaces are fixed in the file and codes are used to represent complex values. There are different standards ANSI (that is spread in

USA), EDIFACT (that is spread in the United Nations), TRADACOMS(that is spread in England) and ebXML and for each standards different version. As a consequence when two companies decide to exchange EDI documents they must agree on a specific standard and version. According to the specific objectives the Edi can have different architectures and configuration but of course the majority of documents exchanged are *commercial or administrative document, Management documents, Financial documents.* The first one includes electronic order, electronic invoices, confirmation of the orders with the main objective to reduce the impact of the activities linked to the order cycle conducted by mail, phone or fax. The automation of the order cycle has got as main benefits the possibility to reduce the mistakes of data entry and cost of the personnel. Documents management instead includes inventory plan or order plan that represent exchanges of information to support the collaboration processes between two companies, in order to increase the coordination of the activities obtaining mutual benefits. Finally Financial documents are payment orders, credit or debit notes and their exchanges require the interconnection between the company and the bank system in order to complete the order cycle. An EDI system is formed by three main components:

- C*ommunication network* in order to transmit the data and to connect the systems of the different companies;
- S*oftware* has the functionality to receive/ send and convert the messages in order to allow the communication between two different systems
- *Codification Rules* defines the structure of the main file in order to allow the correct interpretation.

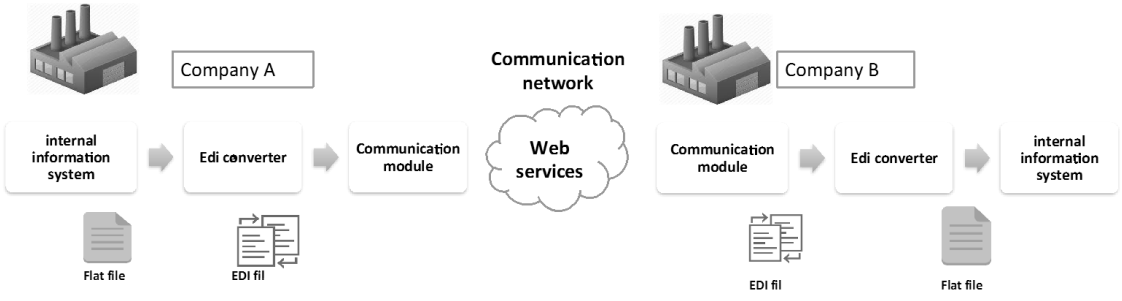


Figure 14 – Information Flow in EDI format.

Considering the exchange of a message from company A to company B the process is quite linear: the message is generated inside the internal system of the company A, that could be an ERP or another internal application system, then the main data, concerning the quantities, the components and the delivery date are extracted in order to generate an internal file called FLAT

FILE. The Flat file is translated in a language that can be interpreted by the system of the company B. In this case the EDI message standard is used by an EDI converted and EDI file is generated. The final file is sent through the communication network in order to be received from the other company. The process is sustained considering the communication module. When the message is received by company B the opposite of the process is executed in order to extract the information. The communication between the two companies is not so direct can be realized also thanks to the intermediaries. The interconnection between two systems can be more complex because of the intervention of the service provider. This solution is a form of outsourcing, the service provider is an intermediate between the two users that want to be connected throw EDI system and it is in charge to provide different services. The services can be the connection to the network in order to unify the two entities; the interoperability as the possibility to adapt the different systems and conversion of different EDI format; the management of the messages transmission processes and security of the communication by the process of identification of the two users. The majority of the service provider are the VAN (Value added network). Today they are also part of big telecommunication companies or internet companies. If the number of companies that want to assume the Edi standard is increasing, it is necessary to define an unique standard, in order to prevent the single company to connect with different formats to different partners. However, the realization of a common standard is one of the main limits of the adoption of the EDI standard.

The possibilities are the realization of:

- *Proprietary Standard:* the creation of a standard to use with a network of selected partner for examples some selected suppliers. The standard that is generated is highly specific and not compatible for other connections external to the project.
- *Sectorial Standard*: the Edi format is created for the internal use among different community belonging to the same sector: for instance ODETTE standard is used in the automotive sector.
- *Public Standard:* when it is necessary to connect different sectors is necessary to create a general standard. For example, EDIFACT is the standard that is recognized at an international level. However, the creation of a generic language has encountered several difficulties for the impossibility to create a code, that is completely adaptable to all the sectors.

Even if there are lots of configuration, the most spread is the one called hub-spoke. Hub is the term used to identify the biggest company inside the network, that has got the capability to impose the standard over the other actors of the network. “Spoke” is the term used to refer to the

high number of suppliers and customers. The hub is the organization that maintains a high contractual power in order to have the capability to select the suppliers, the format for the exchange of messages by EDI. The network is born as an extension of the private network of the hub. The increase of connections with the main partners is the causes of the use of VAN, that are able to adapt to the main requests of the partner. The structure of the network has got a "star shape", in particular, the hub is collocated inside the network and the exchanges are between the hub and the spoke and not among the different spokes. The network is closed with the actors, that communicate following a specific standard, and protected by a system of authentication.

Benefits

In this section, the main aim is trying to sum up the main benefit for an organization that implements EDI. First of all the reduction of costs to conduct the activities: reduction of cost of the personnel, reduction of cost of the activities to exchange the information and insert the different data in the systems each time and finally the reduction of cost for the indirect material such as paper in the order management process (Evans & Towill, 1993). Secondly a more efficient flow of information: the flow of information is automatic with no human intervention. The information is sent during specific interval of time established by the sender and the receiver (Williams & Frolick , 2001). As main consequence the lead time is reduced allowing a reduction of the safety stocks, thanks to the frequent ordering, frequent communication and greater level of accuracy. A higher quality information is guaranteed**:** the standardization allow the possibility to reduce the mistakes of the order, in a way to increase the service lever by reduction of delay (Evans & Towill, 1993). The implementation of Edi is a symbol of trust and forward looking of the firm in the relationship with the supplier creating more cohesiveness (Evans & Towill, 1993).

Limits and criticalities

Lots of studies during 80' and 90' forecasted a success of EDI for the high level of automation, that the solution could have brought in the processes. The actual result is that the EDI was spread in different ways according to the sectors. In particular, it was adopted mainly in the automotive, electronic production and great distribution. The main limits for the adoption of this solution are: the more the level of automation, the more rigid the level of standardization and condition of implementation. The use of Edi was spread for restricted number of actors featured by high number and repetition of the transaction. The introduction of a new member inside the network required the compliance with specific interfaces. The development of a specific

infrastructure is costly and the impact of the introduction of the technology can be significant also on the main business processes. The consequences can be the lots of time for the start-up of the project due to the necessity of reconfiguration the main processes. The modification of the format EDI in order to introduce new functionalities requires huge investments and the introduction of specific systems. Also the development of application based on EDI have a debug time (the time required by the programmer for the elimination of the mistakes). The creation of sectorial standard is not so simple because of the complexity of the language, (Bertelè , Rangone , & Mainetti S. , 2004). Finally the cost for training the personnel can be quite high because of the language complexity, (Bertelè , Rangone , & Mainetti S. , 2004).

Internet EDI

The advent of Internet has generated the possibility to overcome the limitation of EDI: increasing the number of connections also with partners that are small in terms of resources and with a contained number of transaction, guaranteeing a good level of compatibility. The Internet technology has created the possibility to reduce the role of intermediaries (VAN) with a decrease of the main costs for the infrastructure. The Internet Edi allows also the possibility to overcome the rigidity of the standard EDI allowing a better flexibility in the structure and promising convenience also in the case of a normal number of transaction. With the term Internet Edi we refer to the systems able to support the exchanges of EDI messages by the internet technology, protocols and network. As explained in, with Internet Edi small companies have the possibility to access to a website, fill purchase forms, verify the credential and complete in a safe way the transaction. According to (James, 1998), there are three main channels for Internet EDI:

- *Web EDI:* the use of the browser web as a mean to exchange Edi file, by uploading and downloading the material on specific web pages. The creation of on-screen templates where trading partners enter the transaction details. The HTML language is the one used to format the screen template allowing an easy-to- use layout. In accordance with the big opportunity created by Internet lots of VAN started to add also Web EDI services as a source of competitive advantage. These intermediaries allow the user spoke to connect directly to their pages built with images and multimedia in order to maintain a user friendly page. The content in the HTML format is translated into an EDI document that is transmitted to the hub company.

- *FTP EDI*: FTP EDI stands for File Transfer Protocol EDI, which is used in case of very frequent and repeated transactions. One of the partners fills an electronic template, which is converted in EDI standard, then the file is uploaded on the other trading partner's website. The file is protected by specific digital signature or encrypted. Once the document is received by the other party is decrypted in order to protect the security and later opened.
- *E-Mail EDI:* the Edi file are included in the mail by following the MIME standard that was developed by the Internet community. The SMTP is the Simple Mail Transport Protocol , that establishes the main rules to exchange mail that includes Edi standard.

According to (Bertelè , Rangone , & Mainetti S. , 2004), a more recent distinction is realized between Internet Edi, which is the use of the internet network as a tool to simply exchange documents in Edi format, and the Web Edi, that consists in the use of particular web application to upload and download file that can be translated into Edi format.

Benefits

The low level of investment, required to implement the system, allows also small companies with few transaction to adopt the technology, that brings direct connectivity with very low costs, (White, 1996). Small companies can avoid to connect to Value added network and simply rely on the interconnectivity and accessibility of Internet. Future Internet/EDI offerings may simplify EDI for smaller players, so that anyone with a Web browser and an Internet connection can play, (Lankford & Johnson , 2000). In addition, no particular skills are required: the simplicity in the use of the interfaces (the partner has to fill a predefined template with information) allows a fast diffusion. Internet allows to adapt to different systems introducing the scalability, everyone with a web browser and an internet network can be connected to the main hub, (James, 1998). The standard EDI can be introduced also inside firms that haven't the infrastructure because of the web Edi that can translate the ancient format in a readable one. The application introduced in the web are adjustable with simple upgrade, that can enable new functionalities, (Angeles & Nath, 2000).

Limits and criticalities

In literature, lots of authors have listed problems and risks, associated to Internet EDI, such as: security of the data risk, huge investments to introduce security measures, such as Firewall, digital signature or particular key to decrypt the files. "Electronic security solutions need constant updating, and VANs are most qualified for the job", (Ross, Beath , & Goodhue, 1996). The need of introducing security measures according some author will erode the margin created respect to the adoption of the expensive VAN network. (Lankford & Johnson , 2000) is also

adding the problem of the Malfunction of the Internet network, that can create huge delays in transmitting the main information. Some additional costs can be added considering (James, 1998)*:* the necessity to pay to VAN a regular fee in order to have access to the additional services or the necessity to develop a client/server front end application in order to have a basic form to visualize the information.

XML

XML stands for (extensible Mark-up Language) and it is a specific language that define the structure of the documents, text, images and other parts are identified by a particular set of codes, (Hsieh & Lin, 2004). The language is more flexible and adaptable to the changes in the main documents' format, in order to be read on the web and in order to allow the users to introduce specific tag, according to the information they want to introduce. This language so simple can increase the functionalities of the application used by the firms to support the B2b processes. XML is clearer because of the presence of different tags "metadata", that explain the content of the different codes, (Bertelè , Rangone , & Mainetti S. , 2004). It is important to identify a DTD that stands for Document type Definition, in order to establish how the main entities of the file should appear on the browser. Two firms may differ in the DTD, as a consequence the communication between two systems can be realized in an automatic way and this is one of the main limits of XML, (Hasselbring & Weigand , 2001). In order to exchange documents in an automatic way, a standardization of the communication is needed an it must be realized at different levels, not only in the form but also in the syntactical and semantic level.

Benefits

According to (Bertelè , Rangone , & Mainetti S. , 2004), one of the major benefit is the reduction of training of the personnel cost, because of the simplicity of the language thanks to presence of the metadata respect to the complexity of Edi. Data can be inserted in XML format and later translated in Edi, by the web application. The DTD describes the content of the document in XML format allowing interoperability of the main systems of two organizations, (Hasselbring & Weigand , 2001). The language is very flexible can be used to create new standards from scratch for particular sectors.

Limits and criticalities

The diffusion of EDI makes difficult the adoption of XML. The companies, that have spent lots of money for the Edi infrastructure, will continue to use it, (Hasselbring & Weigand , 2001).

XML is very adjustable and, for this feature, lots of application can be realized. As a consequence, there will be the necessity to upgrade the application because of the risk of obsolescence, (Bertelè , Rangone , & Mainetti S. , 2004).

Extranet

One of the main way recognized by the firms to get competitive advantage is work closely with their suppliers, customers and distributors by reaching a common objective, that can be an increase of the service level. The closeness of the company and its own partners can be obtained throw extranet, that allows the firm to share the main resources. An extranet according to (Yen & Chou, 2001) is the use of internet/intranet technology to serve an extended enterprise that includes partners, in order to reach a common goal. Extranet serves as a bridge between the public Internet and the private intranet. Extranets are projected to play a crucial role in the development of business-to-business marketing in the near future, (Ling & Yen, 2001). This technology allows to overcome EDI limits by the advantages created by Internet: a network that exploits the Internet Protocol (IP) to interconnect different networks, allowing systems to communicate with each other. (Kippenberg , 2000) in the paper describes the evolution of this technology that had a great success because it was less costly than Edi. To explain the meaning of extranet, it is necessary to introduce the word intranet, which is a private network used within the boundaries of an enterprise. An extranet is a network of different intranet, so it is a way to unify related firms.

Generally the structure of the technology is composed by:

- Internet protocol TCP/IP: each Local Area Network is recognized by an application;
- Web browser, that allows to correctly visualize the content to all authorized users;
- Web server, that is used to decrypt the information contained in the different documents;
- Remote access server in order to connect the single entity of the network to the central entities;
- Client dial- in software, which is a software installed on the client in order to guarantee the connection;
- Internet connection device, the so called router that provides an IP address;
- Leased line Connection to maintain the connectivity for high volume of information due to normal operation;
- Firewall security in order to protect the system from users that are not allowed to enter in the system.

Among the major field of application of the extranet which can have impacts in all the majority of the activities identified by (Porter, 1985), according to (Kallioranta & Vlosky , 2004) ***(See Figure 11).*** The extranet allows the business partners to exchange data such as: (CAD files) , purchase and orders information. The members can authenticate themselves and have the complete access to groups where they can share ideas for the development of new products. The technology allows the possibility to exchange also feedbacks and monitor the advancement of a common project. Extranet allows to track operational performances, update schedule, provide specification and requirements or alert managers in the case of delays that will impact the exit of a new product on the market, (Ling & Yen, 2001).

Value Chain Activity	Problem	Impact of Extranet
Inbound logistics & Procurement	- Long lead time - Incompatible IT systems - Supplier selection	- Increased collaboration - Reduced order cycle - Reduced search cost - Enables JIT and CRP without EDI - More responsive supply - Small and frequent purchases
Production & Operations	- Inaccurate demand forecast - Bullwhip effect - Excess inventory	- Sharing supply and demand information - Integration of timely and accurate data into planning - Better demand forecast - Reduced bullwhip effect - Reduced inventory
Outbound logistics & Distribution	- Multiple middlemen - Delivery costs	- Elimination of intermediaries - Electronic delivery - Accurate shipment - Improved availability of tracking information
Marketing & Sales	- Costly and difficult market information attainment	- Improved market and customer information - Faster documentation process - Faster payment cycle - Lower communication costs - Improved relationship
Service (during & after)	- Response time - Costly customized information	- 24/7 information access - Faster response - Customized service at low cost

Figure 15 – Dominant problems in the chain and impact of Extranet implementation,(Vlosky and Kallioranta 2004).

Benefits

The majority of the benefits can be distinguished considering the impact on the competitive advantage and the savings on costs. If we consider the first class, the digital tool help to speed up the processes, creating a knowledge base among the partners in order to get to the innovation. If we consider the second class of saving, the reduction in set-up costs can be pursue due to the simple structure: especially, the extension of intranet, already put in place, is a simple process, because of the possibility to exploit the hardware, the software and the network application, (Kippenberg , 2000), (Ling & Yen, 2001). Web technology is flexible and can be adaptable over the all the hardware and software, increasing with the platforms the

functionalities, (Ling & Yen, 2001). The extranet allows the possibility to have information filtering in order to access only the data of interest in an efficient way. Speed of data transmission allows the possibility to answer with real time data to users' requests, savings on personnel and material costs Extranet allows the possibility to reduce the repeated tasks optimizing the processes. Cost savings are generated due to a better management of procurement, logistics activities and allowing a complete visibility over the supply chain. Finally, Extranet permit the creation of a virtual environment, where partners can meet overcoming geographical and time barriers, (Kippenberg , 2000).

Limits and criticalities

For a successful implementation of an extranet, different authors explain the importance of the right cultural aspect inside the organization and the commitment of the top management in supporting the tools, in order to win against the employee inertia. In addition, a good digital culture should be spread also in the partners' companies in order to make them aware of the importance of sharing the right information,. The cost for the extranet development can be quite high, considering the main functionalities that the corporate partners want to adopt. According to (Ling & Yen, 2001), (Chan & Davis, 2000) another important limit is necessary for constant maintenance: when the system is not available, it interrupts all the processes among the business partners. In addition, it is also necessary to upgrade the content and the main application. As said previously, extranet is a private network, for this reason, it is necessary to invest in a security system, in order to protect the environment.

RFID

The RFID system is composed by different elements generally a tag, readers and communication infrastructure. An RFID tag is formed by a microprocessor chips, that can be active (with batteries) and passive (without batteries). Active tag are able to communicate with the lecture system and they are able to emit waves with a particular frequency, in order to be located. A passive tag is able to communicate only when they receive the right amount of energy obtained by the reading system. The reader is a device that has the main functionalities to read the signals coming from the tags and to write on them. The signals must work according to specific working frequency and protocol, in order to allow the tracking and the tracing of the item. "Tracking refers to the ability to follow the downstream path of a product along the supply chain, possibly according to some specific criteria". "Tracing, on the other hand, refers to the ability to determine the origin and characteristics of a particular product", (Bechini & Cimino,

2008). Finally, the last component is the communication infrastructure that is the group of wireless network communication, that carries out the data exchanged during the communication. RFID had great diffusion in different fields (Ngai, Moon , & Riggings , 2008), especially in the logistic and supply chain management fields. For instance RFID can be adopted to support collaborative supply chain processes: share real time data about the stock level inside the main warehouse, monitor the results and the level of advancement of the main intra-firm processes and support the quality control process by the identification of the different modules of the product.

Benefits

The majority of the benefits allowed by the adoption of these technology are described in the paper (Spekman & Sweeney , 2006). One of the major benefits is the possibility to overcome the company barriers, creating more synchronization with the partners' processes, in order to collaborate to reach the common objective. The Rfid technology allows to better manage the logistics activity offering a great service to the final customer, avoiding the risk of running out of stock on the shelf. Another important issue is the possibility to track the different components in a way to understand the origin of the raw material and the possibility of defects and interruption of the production, to facilitate the quality control with the reduction of time to present the product in the market. The information is more reliable, data are updated and this can sort out lots of disputes about lost items, that are present nowadays among business partners.

Limits and criticalities

Despite the great enthusiasm created by the technology, different problems were generated because of the great level of investment that the first movers had to accomplish. The quality and the reliability of data depends on the possibility to have a free flow of information among the business partner, that is obstacle by two main factors. First of all physical barriers because of technical problems in the implementation of RFID and, secondly, the interpersonal impediments, that destroy trust and the collaborative behaviour, (Spekman & Sweeney , 2006).

Supply chain practices that enable collaboration

VMI -Vendor managed inventory

Vendor managed inventory is one of the main collaborative supply chain practices, that has got as main aim the efficient replenishment among business partners. The VMI allocates the replenishment responsibility to the supplier that makes choice on the customer's behalf, considering the level of customer's demand and respecting the requirement of service level (Vigtil , 2007). In this way, the VMI allows the supplier to better plan the production in order to optimize the process and decrease of logistics and transportation costs. The advantages are also for the customer that can be secure of the reduction of delays in the deliveries of the items. The process imply an exchange of information between the two business partners such as: stock levels, incoming order, promotions, stock withdrawals, production schedule, sales forecast, performance metrics and delivery schedules. In order to enhance the rapid flow of information an advanced ICT infrastructure is necessary, for instance, bar code and scanner are correct tool to understand the level of inventory inside the main warehouse. The main enablers for a correct implementation of the practice, that emerge from the literature are: relationship quality, information quality and reliability and final a good communication system. If these factors are absent the majority of the time the benefit expected from VMI are not realized.

CPFR - Collaborative Planning Forecasting and Replenishment

Collaborative planning, forecasting and replenishment is the last stage in the evolution of the collaborative supply chain practices, (Attaran, 2007). CPFR includes the main advancement in the previous supply chain practices:

- VMI that allows a better management of the level of inventories between business partners, allowing a reduction of inventory costs and an improvement in the service level such as the item fill rate.
- Continuous Replenishment program (CRP), that allowed and automatic replenishment between business partner allowed by based on the data collected in the point of sale about the customers demand's trend.
- ECR (efficient consumer response), that enables the introduction of savings inside the supply chain by bringing an improvement in the main areas of replenishment, product assortment, trade promotion and new product introduction.

CPFR is a practice that enables to decrease the level of uncertainty inside the supply chain, improving the communication among the main actors. The practice is based on the main assumption, that both the supplier and the seller must contribute in understanding the final customer's demand, which is at the centre.

The model can be divided in four main stages:

- *Planning*: creation of the relationship between the buyer and the seller with the establishment of the main requirement and goals;
- *Forecasting of demand and supply*: joint identification of the sales forecasts and planning of the orders;
- *Execution* : implementation of the plan with the delivery of the stock and the transactions;
- *Analyses* : in this step the two partners analyse if the output is different from what expected, there is an adjustment of the procedures.

Also in this case the successful implementation of the practices is realized by a collaboration of the two partners for the same goals and incentives alignment. Trust and reliability of the information are crucial for a correct implementation of the procedure. The technology, that is chosen between the two parties, must allow the integration and rapid exchange of data and finally the infrastructure must be protected by a security system in order to avoid opportunistic behaviour. The CPFR projects launched in recent years have allowed retailers, manufacturers and the Supply Chain as a whole to seize many benefits, (Nøkkentved, 2000), some of which are summarized as following:

Benefits for the retailer	**Benefits for the producer**	**Benefits for the Supply Chain**
▪ Increased sales; ▪ Higher level of service; ▪ Reduction of lead times in ▪ Order cycle; ▪ Reduction of stocks, of ▪ Risk of obsolescence and deterioration.	▪ Increased sales; ▪ Increase in evasion rate of orders; ▪ Reduction of stocks of product; ▪ Reduction of cycle times; ▪ Better capacity management productive.	▪ Direct flow of materials (Reduction in the number of points Storage); ▪ Better forecasting capacity; ▪ Optimization of trade-off between Supply Chain costs.

Figure 16 - Benefit CPRF (Nokkentved et al., 2000; Sheffi, 2002)

PDM - Product data Management

Product data Management (PDM) system is typically used to exchange data containing information about the architecture, the drawing, the specification, the bill of material about the product. All the information also about the product lifecycle are preserved inside the system and all the partners of the main focal company can have access to it, increasing the level of integration among the supply chain. The PMD tool is used not only for data management but also for engineering and communication among actors, (Xu & Liu, 2003). The system allows the collaboration among suppliers that live in different countries, allowing them to share ideas from the concept development of the item, until the realization of the final version of the product. The main architecture (1990) is the typical two tiered approach with the client, that only ask for request and visualize the output of the research and the main server that process the data. According to this, the system is formed by a main central server, that filters the data contained inside the different data-bases, according to the main requests of the group of users connected to it. The users are connected with the server using LAN (Local area network) or intranet. The objective was trying to adapt the technology and the main tools functionalities, in order to adapt to a context where there are partners, that collaborate in different countries using different platforms. That's why PDM was developed over the internet, allowing to overcome geographical barrier, with a three tiered structure. The adoption of the application web has created the possibility to avoid installing costly software over the client server and, in addition, the possibility to expand the PDM application over different machines inside the organization. The web application are also easy to use because they are characterized by an easy use of the interface, with an progressive reduction in the costs for training the personnel. The main concern of the introduction of web PDM is the security issue. External users can infiltrate the system and have the access to important information about the characteristic of the product, as a consequence is necessary to introduce firewalls, to protect all the infrastructures.

1.3 Literature review on factors responsible of the adoption of e-collaboration

Different authors have focused on the phenomena of e-collaboration. *Chong et al (2009)* defines it as business-to-business interactions, facilitated by the use of internet technologies. It does not only refer to Electronic Data Interchange to support the simple buying and selling transactions but also "information sharing and integration, shared decision-making and process and resource sharing". Although big companies such as Dell and Walmart were the first in adopting these new practices thanks to the huge investment capabilities, the adoption in Small and Medium Enterprises is still limited. The literature has analysed the different drivers and barriers for the adoption of the e-collaboration tools.

TOE - Technology-organization environment model

The model, (Tornatzky & Fleischer , 1990), takes into account contextual variables in the e-business assimilation:

- Technological context: it describes both the existing technologies in use and the new technologies relevant to the firm, to be introduced to improve the main processes;
- Organizational context: it is a variable that take into account the features of the firm such as scope, size and managerial structure;
- Environmental context: it is related to the industry, the competitors and the dealing with the governments.

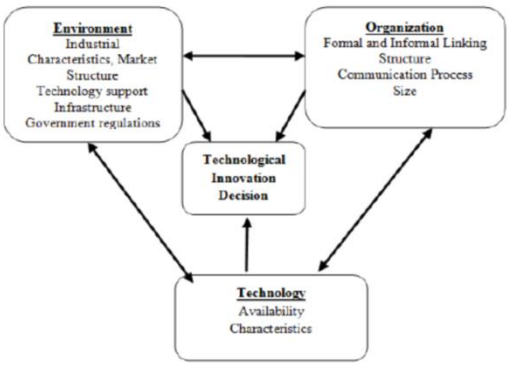


Figure 17 – TOE model, (Tornatzky and Fleischer, M. 1990).

The model, ***See Figure 13***, was used to explain in early studies by different authors. (Zhu , Kraemer , & Xu , 2003)conducted an investigation over the adoption digital tool to support supply European supply chain considering these factors. (Iacovou , Benbasat, & Dexter , 1995), instead, used them to explain the adoption of EDI. The main limit of the model was the fact that took into account the problem of compatibility that today is overcome by the use of internet.

IOR - Inter-organizational relationship model

A further step in the study was introduced by (Chong & Ooi, 2009) (Huang, Janz, & Frolick, 2008) with the identification of the main inter-organizational factors in the adoption of e-collaboration. The model is proved by the empirical analysis, conducted by the author among Malaysian E&E organizations. The first variable the product complexity is the first drivers towards e-collaboration, it requires joint effort between the suppliers and the customers in the area of design and product development; for this reasons, these activities can be enhanced by the use of digital tools. Products with higher volume and frequency of transaction create value in the relation and the possibility to start investment allowing supply chain integration among the partners. Finally trust is required as main element, because, in collaboration, important information are shared with the partners, such as data about the forecast and reserved information about the product structure and design.

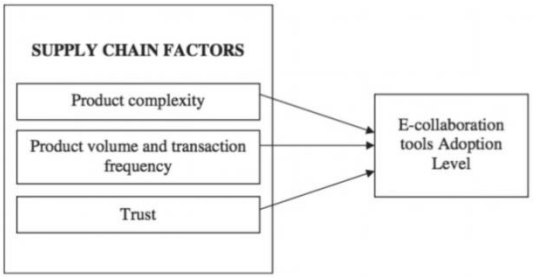


Figure 18 – IOR model (Chong et al. 2009, Huang et al.2008).

The Unified theory of acceptance and use of technology model

The Unified theory of acceptance and use of technology UTAUT model by (Venkatesh, 2003)is covering another gap in the literature, taking into account the attitude of the employees, managers and directors towards the technology, in particular this aspect is declined in three main variables:

- *Performance expectancy* is the degree to which an individual believes that using e-collaboration will help him or her to attain gains in job performance*;*
- *Effort expectancy* is the degree of ease associated with the use of e-collaboration tools*,;*
- *Social influence* is the degree to which an individual perceives the person who is important to him/her believe that he/she should use e-collaboration*;*

Conceptual model

The paper introduced by (Chan, Chong, & Zhou , 2012) has summarized the main models discovered in the literature with the main objective of explanation of the main factors of adoption of e-collaboration tool, in small and medium enterprises, considering the different stages of adoption.

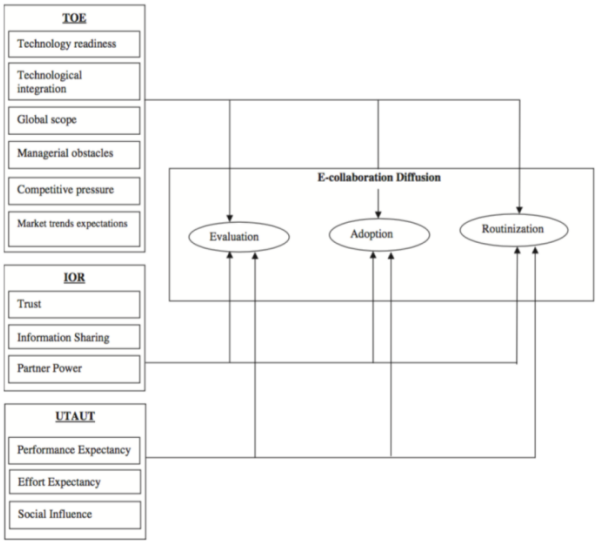


Figure 19 - Conceptual model (Chan et al 2012).

As it is possible to see in the picture above, there are three main stages of adoption. The first stare is *evaluation stage*, that is the moment in which compare the company is evaluating the potential benefits offered by e-collaboration tools and the cost of the project. The *adoption stage* is when the company pursues the decision to adopt the technological tools putting both financial and human resources in the implementation phase. The last stage is the *routinization stage* when practices are spread across the firm boundaries in order to regulate and optimize all the processes. The results of the research are very interesting. In the first stage, the theory that links the individuals towards the technology is the one that has the main influence in terms of managerial readiness and lack of confidence towards the technology. In the second stage, the variables of the IOR models are the one with the major influence. In particular the trust in the suppliers partners and the power in the focal company, that is able to impose the standard over the supply chain. Finally, the last stage is also influenced as well by the relationship variables (IOR). In particular the routinization will be facilitated in those relationships, where the supply chain partners work closely sharing important information and resources.

Research model

(Chong & Ooi, 2009) has investigated the SME in Malaysia, taking in consideration the IOR model as factor facilitating the adoption of e-business supply chain technology. Different variables are considered, like the trust as the a positive attitude towards and the expectation of loyalty and fairness; the communication as the ability to transmit important, the reliable information in order to take important decisions; the collaboration as the same efforts put by the partners to reach the same goal, the information sharing as the possibility to have visibility over the supply chain avoiding gaps in the information and finally the trading partners power as the capability to of the focal company, to impose a standard over the supply.

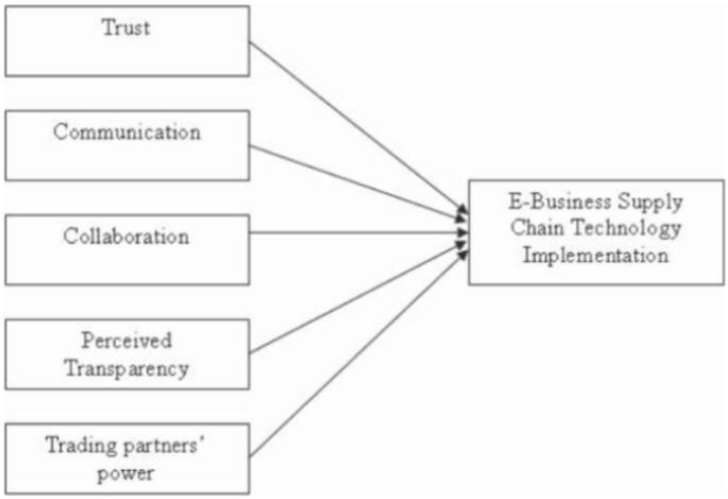


Figure 20 - Research model (Chong et Ooi 2009).

The results of the study are quite interesting, in particular, despite the previous models, the trust and partners power have lost their influence towards the adoption of e-business tools. It is due to the advent of internet, that become the main mean to obtain less cost flexibility and interoperability. In addition, the focal company has to convince the partners by communication and explanation of the benefits of the technologies, rather than impositions and threats.

Considering the main important contribution of the authors and the main models affecting the adoption of e-collaboration tools, in the next section (Chong & Ooi, 2009) *model is further investigated. The reinforcement of each attributes is performed throw a deep review of the literature, and it will be the starting point for the creation of the Framework,* ***See Section 5.***

2. FASHION INDUSTRY

2.1 Structure of Fashion Supply Chain

The attention to the Fashion Industry is mainly driven by its the particular and interesting nature, that wants to join the physical part of the product with the immaterial and intangible value. Fashion can be seen as the point where the material product, in the form of clothes, meets the immaterial aspect of what looks good at a given point in time. According to (Christopher, Lowson , & Peck, 2004) "fashion is a broad term that typically encompasses any product or market where there is the element of style that is likely to be short lived". This peculiarity makes the Fashion sector subject to constant and quick changes, where time is becoming more and more crucial. The high complexity of the sector is managed by specific Supply Chain Model that want to protect Companies from uncertainty and risks, regarding both the demand and the supply side. Supply Chain Management allows to respond quickly, efficiently and with flexibility to the fluctuation in the demand (Battista & Schiraldi, 2013) Obviously, the main challenge is gaining value through supply chain management, allowing to respond quickly, efficiently and with flexibility to demand fluctuations Battista and (Battista & Schiraldi, 2013). This requires market sensitivity, which guarantees connection to the customer and capacity to capture trends as they emerge; integration with all the other Supply Chain actors sharing real-time demand data and process alignment, both within the company and externally with upstream and downstream partners, (Masson , Iosif, MacKerron, & Fernie, 2007).

Evolution of Fashion industry and Supply Chain Structure

The canonical representation has been, up to the nineties, industrial and engineering, because only the technical sequence of the transformation phases was recognized. In the second half of the nineties, the graphic representations of the "Fashion" chain (Ricchetti & Cietta, 2006)is enriched with a system of distribution, communication and design services. From a manufacturing standpoint, the fashion industry is characterized by a high degree of modularization of the production cycle. The production process, that starts from raw materials and it is articulated in a long chain of phases. Generally they are carried out by independent and specialized subjects or realized in house, under the control of a single company. So, fashion-clothing industry refer to the steps from one production stage to the other, that is given by the market. Its representation is a sequence of activities all over the industry that is articulated in: preparation of fibers, filature, weaving and packaging apparel. The sequence can be more complex, adding more variants regarding type of fibers, processing techniques and product uses.

After the nineties the representation started progressively to change, taking into account all the processes that were considered as services before. First of all the supply chain increase its extension: many companies were following the trend to integrate vertically downstream with own chains of stores; the emergence of forms of cooperation between industry and distribution, trade marketing formulas and the development of the Quick Response model, which change the perspective from the industry-driven towards the distribution-driven approach. In addiction Quick Response concept introduced the idea of a chain as the place of information exchanging, as well as of goods. *For all the reasons the final image is an industrial chain that interacts with numerous support services and partners that influence and direct their activity* (Figure 3.2).

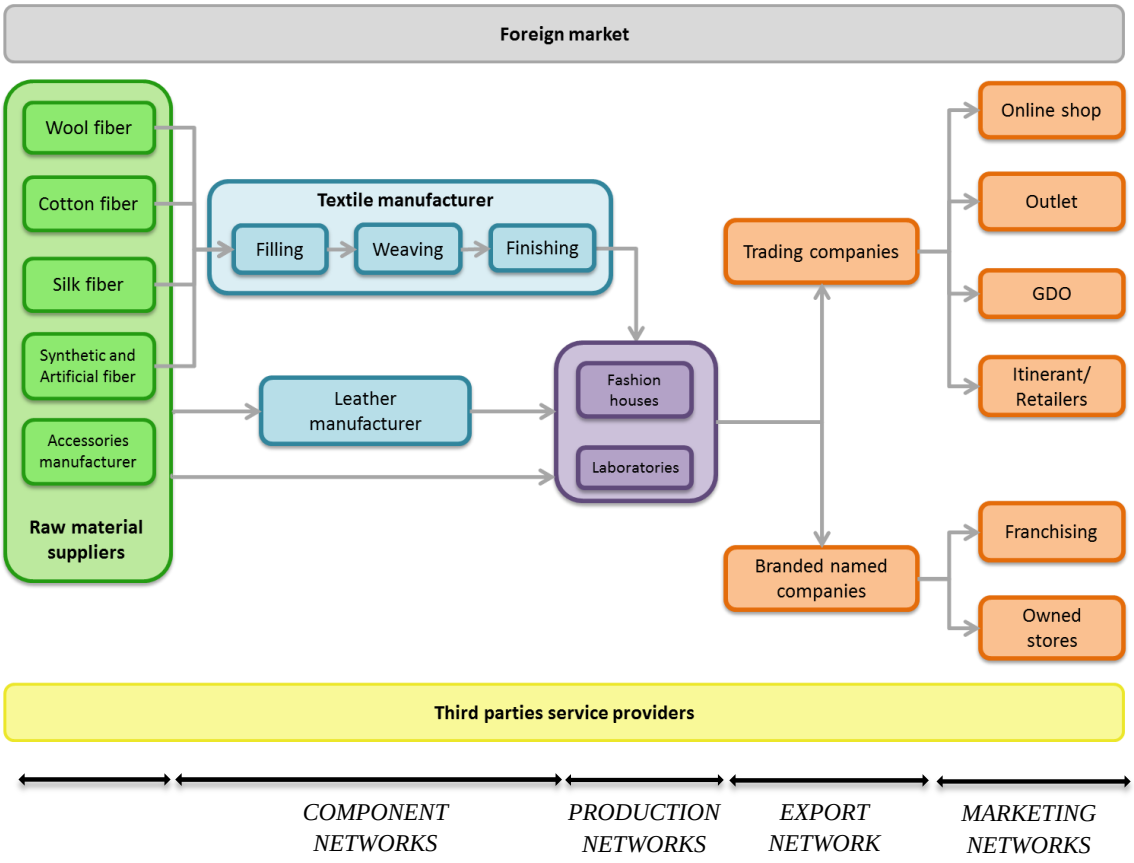


Figure 21 - Structure of Fashion Supply Chain.

2.2 The Actors of the Fashion SC: roles and peculiarities along the chain

After presenting the general scheme of the chain, the following step is the analysis of the actors in detail, focusing the attention on their role, managed product and service, and flows that cross them. The actors, that make up the Fashion Chain, are therefore:

1. raw material supply, including natural and synthetic fibers;
2. provision of components, such as the yarns and fabrics manufactured by textile companies, and also leather components;
3. production networks, made up of garment factories, including their domestic and overseas sub labor suppliers;
4. distribution channel, that includes the export channels established by trade intermediaries and the marketing networks at the retail level.

Raw material suppliers

The first step of Textile Supply Chain is the set of firms responsible of producing the raw materials, considering both fibers and accessorize. Fiber is the smallest component of the fabric, but it is also the one that hurts color, weight and solidity. The most important innovations in the fiber sector are referred to search for new features and new materials.

Managed products and services: It is possible to identify Natural fiber suppliers, the most important are wool, cotton and silk fiber; synthetic and fiber Artificial fiber and all the row material used by leather manufacturers and accessorize manufacturers (for the aim of this work, the machineries producers will not be considered as part of the supply chain). Raw material suppliers are mainly managing products that could be considered as commodities, due to small number of processes and customizations that are involved. Their importance is increasing day by day for two main reason: first, the quality of raw materials is a key feature for the success of high-quality garments, and second the raw materials choice should also consider the sustainability conditions to which fashion houses are becoming more sensitive.

Flows that cross them: They have relationship with Textile manufacturers as well as Fashion Houses. The first case is related to strong and continuous interactions among the partners because raw materials are the only input of the Manufacturing process. The second case is instead less frequent; the interaction could happen when the Fashion House buys raw material directly or indirectly for its suppliers. The last case happens because it needs strong control over the supply chain, in terms of sustainability issue, quality and time feature.

Margin, value added, numeracy: The difficulties of the industry are further fueled by the growth, recorded since 2010, of the price of all major raw materials. By analyzing the course of the various fibers, in December 2016, prices of Australian lanes, measured in euros, compared to last November, an increase of + 3.1% in the Awex Eastern index. The price of cotton has, similarly, an increase on the basis Congenital (+ 3.2%) is mainly on an annual basis (+ 16.5%), that is compared to the previous year. Based on the calculations made by the SMI Studies Center on quotes from Yarns and Fiber Exchange (YnFx), December 2016 euro prices for synthetic fibers show a positive change (+ 8.2%) compared to last November; Artificial fibers account is + 0.7%. An upward trend is found prices for both synthetic fibers (+ 14.5%) and artificial fibers (+ 3.4%).

Manufacturers

The second step is composed by the textile and leather manufacturers. They are small players, that work on small tasks and they are interconnected each other with strong and long-lasting relationships, and also some big industrial realities.

Textile Manufacturers. There could be just one actor or different actors working together in this ring. Although the Textile Industry is widespread in the country, it is mostly concentrated in well-defined districts, due to historical, social and economical the causes. In the "Margin, added value and numeracy" sub-paragraph there is an indicative subdivision of the geographical location of the Textile industry with some economic data of the major districts of the Textile industry (Data of Chambers of Commerce).

Figure 22 – Italian Fashion distric map (Osservazione Nazionale Distretti Italiani, Report 2014).

The following table refers to the main product categories of specialization in each district (core business, textiles and clothing in this case); the less relevant ones are not exposed (for example, the mechanical engineering sector Textile industry or the production of chemical products for textiles). It is interesting to see how the district of Biella faces a number of companies lower and a fair number of employees, but it has a significantly higher turnover than other Districts, index of the presence of larger companies with a high-quality production. Important industrial districts are also located in Veneto (in the province of Treviso and Vicenza) and large Plants are in Piedmont and all over the north and the center of Italy. The data presented are taken form (Osservatorio Nazionale Distretti Italiani , 2014) and it is related to the whole territory to which the district insists.

Textile Districts - 2014		*# of Companies*	*#Employee*	*Export [milion €]*	*Reference body*
PRATO	**Wool**	8202	31808	2093	*Unione Industriale Pratese*
COMO	**Silk**	1447	14550	1476	*Unindustria Como*
CARPI	**Fiber**	4044	17908	2035	*CARPIFORMAZIONE SRL*
VARESE	**Cotton**	6225	32335	4193	*Unione degli industriali della Provincia di Varese*
BIELLA	**Textile**	1673	18393	2098	*Comitato di Distretto presso Camera di Commercio di Biella*

Figure 23 - (Osservatorio Nazionale Distretti Italiani, Report 2014).

Managed products and services: The fibers are processed into fabric and finished garment. In general the process is composed by: Filling phase, which prepares the different types of raw material to the subsequent processing for obtaining the yarn; Weaving phase of the fins, starting from the yarns; Finishing stage, includes a range of treatment that may affect fiber, yarn, fabric and sometimes the finished garment, like dyeing printing and finishing texture. This is the generic textile-production process, but the macro activities may be arranged differently. For example the three phases (dyeing, printing and finishing) of the finishing activity could have the following mixture: dyeing, for example, can be made before weaving (leading to Jacquard ration, with which the so-called dyed garlands are obtained), or even sometimes it can be flipped in parallel with the filling (dyed pasta or flour stained); it may happen that the phases

printing and finishing are done after manufacturing (for example for t-shirts or for sportswear); there are also processes in which some phases are not even implemented.

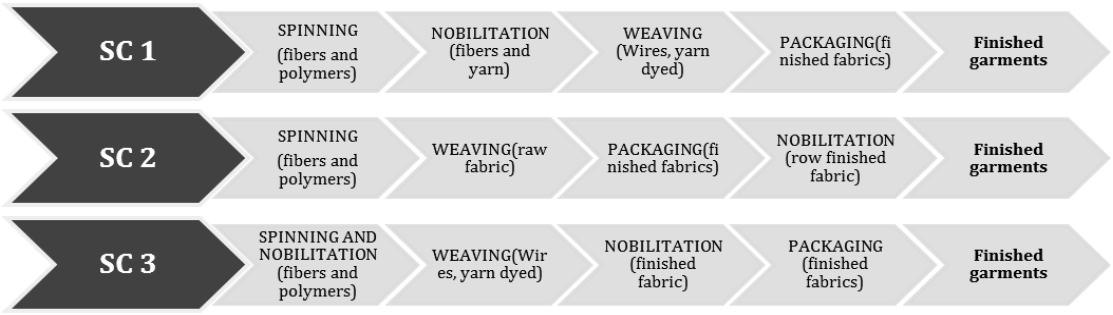


Figure 24 - Main paths according to the typology of fiber used

Flows that cross them: The products passing through the Manufacturing and Leather layer can have different path, according to the company's strategy and needs. This kind of actors can have three strategies to follow: they can have strong brand, competences and individuality to manufacture and propose through a catalog their own final products to the Fashion houses, or they work on commission, Fashion houses order to Manufacturers models or finally a mixture of the two.

Leather manufacturers. The industry recycles and ennobles a scrap of meat food industry, raw skins produced as a result of slaughter. The main animal species processed are adult bovine animals, affecting 71% of total production, followed by sheep (11%), goats (10%) and calves (8%). Less than 1% of tanned leather belongs to other animal breeds (reptiles, pigs, etc.). The most important customers of national tanneries have always been shoe manufacturers, which sell almost half of the leather produced at national level (42%). Next comes leather goods (25%), collection peculiarity industry (16%), car interior (10%) and clothing (5%). Finally, there is a 2% residual for strongly marginal uses (binders, etc.).

Managed products and services: The tannery production process is very complex and consists of alternating chemical and mechanical operations. All chemical operations, up to the finishing, are carried out with the use of water and a typical tannery reactor said bottle, essentially consisting of a cylinder rotating around its axis where the skins, water and products are introduced Necessary chemicals. Immediately after the killing of the animal, skinned skin is subjected to conservation processes to block the start of rotting processes. Conservation, for salting or drying, is carried out in the slaughterhouse or by specialized companies. The skin can also be stored for up to 10-12 days for cooling (+2 ºC).

Flows that cross them: Tanning is one of the most internationally industrialized Italian industries, as emerges from foreign trade data. Exports of tanned leather, destined for 122 countries, account for more than three quarters of total turnover (more than twice as many as 20 years ago). If the European Union turns out to be the largest customer geographic macro-area (50% of total exports), since 1995 the main foreign country of our skins is by far China, which, including Hong Kong, affects 16% On the total exported and, consequently, by 12% on overall sales of the sector. An important role for the sector is also played by the import of raw materials, as foreign supply, which originates in 119 countries, covers more than 90% of the industry's needs. Given the fundamental importance of supplies from abroad, the problem of protectionism on raw material, particularly intense, unfair and growing, by some notable non-EU competitors (Brazil, India, Argentina, Russia, Ethiopia, Nigeria, Pakistan etc..). To date about half of the world-wide raw skins are taken out of the free market by imposing duties and other non-tariff barriers. In spite of the fierce competition of the aforementioned competitors, which are also favored by insufficient environmental and social standards, the Italian tanning industry still holds an undisputed international primacy. In fact, the value of production is 19% worldwide, up 67% if we consider the European Union as a whole, while at the commercial level we calculate that a finished skin of four traded between international operators of Italian origin.

Margin, value added and numeracy: The Italian tanning industry employs 18,000 people in approximately 1,300 companies, with an annual turnover of € 5.2 billion and is historically considered the world's leading provider of high technology and quality development, strong environmental commitment and innovative capacity in terms of Stylistic design. The production currently stands at 124 million square feet of skins and 26,000 tonnes of sole leather. The sector is mainly formed by small and medium-sized enterprises, developed mainly within specialized districts for type of processing and merchandise destination.

Producers

The Production and packaging stage include the “focal” actor of the Supply Chain, that are heterogeneous and can be classified as following, mainly considering the size/dimension of the company and the decision power along the supply chain:

Fashion houses. They can produce internally or they use outsourcing for extra volumes, specific products, or some processes of the production. They are big industrial companies (international horizon, high variety of products, belonging to different segments); medium industrial companies they are focused on specific products in national market; accessorize producers; or big international players that implement a retail distribution strategy, mass market focus with high variety of products.

Labor suppliers. They could be third parties (small medium enterprise, focused on the final product); or small laboratiories (very small reality, they are focused only on small task related to the packaging and final products are the general responsible for the actual production of finished goods based on fashion houses specifications). Hey do not own the goods they produce but are mere executors. Usually firms of this step are very small and work for fashion houses who own the brand. This sector is characterized by low level of concentration and high level of specialization especially for what concern the productive cycle.

Managed products and services: producers can have different kind of business models, according to the processes and the flows managed:

- Assembly/Cut, Make, and Trim (CMT): Apparel manufacturers cut and sew woven or knitted fabric or knit apparel directly from yarn;
- Original Equipment Manufacturing (OEM)/Full Package/Free on Board (FOB): the manufacturer is responsible for all production activities, including the CMT activities, as well as finishing. The firm must have upstream logistics capabilities, including procuring (sourcing and financing) the necessary raw materials, piece goods, and trim needed for production;
- Original Design Manufacturing (ODM)/Full Package with Design: it focuses on adding design capabilities to the production of garments;
- Original Brand Manufacturing (OBM): it focuses on branding and the sale of own-brand products.

Distribution

Fashion industry is the example of a buyer-led commodity chain due to power asymmetries between suppliers and global purchasers of final clothing products *Gereffi & Memedovic, (2003*). Global buyers determine what should be produced, where, by whom and at what price.

Distribution is the last step of the Fashion supply chain, the point of contact between supply chain and its final customer. It combines indirect and direct distribution.

Branded named company. Producers can manage direct distribution using branded named shops or under franchising contracts; in this case, they can keep high control of item sold and customer experience better. In this category, it is possible to consider Owned outlet and brand stores (including also the brand online store/ecommerce, that as low margin, increasing in recent years). In this case, the distribution can be constantly monitored, because they are not external partner but internal reality of the company.

Trading companies. Large quantities of products flow towards GDO, sometimes it has big and constant EOQ and need standards to manage the contracts; Outlet, that is born for the disposal of past season's inventories; Retail shop and online shops (like ASOS, Amazon, that is a growing and growing channel). Once Producers sell the products to them, without collaborative strategies with the distributors, they are not able to see the final market.

LEAD FIRM	TYPE OF BRAND	DESCRIPTION	EU-27
Retailers: Mass Merchants	**Private Label:** The retailer owns or licenses the final product brand, but in almost all cases, the retailer does not own manufacturing.	Department/discount stores that carry private label, exclusive, or licensed brands that are only available in the retailers' stores in addition to other brands.	Asda (Walmart), Tesco, C&A, and M&S
Retailers: Specialty Apparel		Retailer develops proprietary label brands that commonly include the stores' name.	H&M, Benetton, Mango
Brand Marketer	**National Brand**: The manufacturer is also the brand owner and goods are distributed through multiple retail outlets.	Firm owns the brand name but not manufacturing, "manufacturers without factories." Products are sold at a variety of retail outlets.	Ben Sherman Hugo Boss, Diesel, and Gucci
Brand Manufacturer		Firm owns brand name and manufacturing; typically coordinate supply of intermediate inputs (CMT) to their production networks often in countries with reciprocal trade agreements	Inditex (Zara)

Figure 25 – Typologies of producers and description (Gereffu & Memedovic, 2010).

Fashion Association

In Italy there are different federations, and from year 2018, they will group under Confindustria Moda. They will retain operational autonomy on vertical and specific topics in each sector, such as events and trade fairs, while Confindustria Moda provides its associates, for the time being, cross-cutting services of legal advice, industrial relations management and a study office. Confindustria Moda has a governance system that provides for alternation between the SMI and FIAMP biennial mandates, and two general directors with specific powers. The most important federation are:

SMI - Sistema Moda Italia is one of the world's largest representative organizations of textile and fashion industry in the western world. The Federation represents an industry that, with more than 400,000 employees and nearly 50,000 companies, is a key component of the Italian fabric and manufacturing fabric. The Federation aims to protect and promote the interest of the industry and its affiliates and represents the entire chain, nationally and internationally, in relations with institutions, public administrations, economic, political, trade union and social organizations. In particular, the operation of SMI, which contributes to making textile and fashion one of the most important economic sectors of the Italian industry.

FIAMP - Federazione Italiana Accessiorio Moda e Persona is a sector federation that has been established among the following National Producers Association of Accessories, associated with Confindustria:

- AIMPES "Associazione italiana manifatturieri pellettieri e succedanei", www.aimpes.it
- Asso Calzaturifici "Associazione Italiana Di Calzaturifici", www.assocalzaturifici.it
- ANFAO "Associazione nazionale fabbricanti articoli ottici", www.anfao.it
- AIP "Associazione italiana Pellicceria", www.aip.it
- FEDERORAFI "National Federation of Craftsmen Jewelers", www.federorafi.it

The purpose of the federation is to identify possible synergies in the category of the fashion accessory product, to perform a representation function towards third parties and to collaborate in the consultation and sharing of problems and instances of the individual associations. The Federation, in particular, wants to examine, evaluate and deal with the economic problems that have common aspects and interests for the Associations; to represent the categories that belong to the Federation Associations, in relations with the Institutions and Administrations, with the National and Regional Political and Economic Organizations for the Interactional Problems of the whole sector represented and to represent the problems of the entire sector represented.

UNIC - Unione Nazionale Industria Conciaria is the most important worldwide association of tannery industries. It has been working since 1946 for the protection of associated companies and is representative of a strategic sector, a key component of Italian economic fabric and manufacturing. It promotes the interests of the category, represents it at every level, promotes innovation, enhances its social and environmental role, and is a functional trading company for the sector market. It joins Confindustria, the European Conservation Confederation and the International Tobacco Council (ICT).

2.3 The main characteristics and challenging of Fashion SC

This paragraph describes the main characteristics and challenges of the industry, focusing on customers, products segmentation, Supply Chain models and drivers. As said before, Fashion Industry is a manufacturing Industry with several complexities, that make the management of the productive and logistic process difficult. According to (Christopher, Lowson , & Peck, 2004) there three main characteristics that can describe the industry:

- *Short Product Life Cycle:* products life cycle has a very different path compared to the ones belonging to other markets. As it is clear in the graph, Fashion sales trend has a sharp in the growth but immediately a stage of decline. (***Figure 22)***

Figure 26 - Product lifecycle in the fashion industry compared to other markets (Bandinelli et al., 2011)

- *Unpredictable and Volatile Demand: c*onsumer demand can completely change taste and choice in a short time range driven by extremely unstable phenomena, such as weather, movies, sports, etc. (Wang, Gou, Sin, & Yue, 2012). It is not possible to understand if a fashion item will be successful or not, considering past sales, or historical data.
- *Impulsive Purchasing Behavior: c*ustomer purchasing decision could be fast, not rational and impulsive, so retailers have to arrange layouts and displays items in an appropriate way in order to manipulate purchasing decisions. (Christopher, Lowson , & Peck, 2004) pointed

out the need to ensure high availability, in terms of product range but also in terms of variants.

These aspects will inevitably influence the Supply Chain, and the pressure provides a challenge to the entire management to be more reactive, flexible, and connected with the external world. There are other characteristics highlighted by several studies in this sector are:

- *Demand-Driven Supply Chains,* (Walters, 2006)*:* the growing competition in the industry, and products offered let the consumer increase their expectation asking for speed, variety and style at low prices;
- *Extremely Wide Product Variety,* (Vaagen & Wallace, 2008)*: p*roduction lines are changing in more variable and smaller batches in order to embrace the needs to refresh products.;
- *Long and Complex Supply Chains,* (Bruce M. & Daly)*:* companies in the industrialized countries decided to off- shore the labor-intensive stages of the supply chain to low-cost countries, and so more and more suppliers, coming from several different country, are included into the supply network of the Fashion Houses. This decision increases lead time even reducing labor cost;
- *Long time-to-market,* (Forza & Vinelli, 2000)*:* from the definition of the clothing item to the delivery to the stores, pass almost one year. This means that wholesalers and stores define their orders before the previous season is over and therefore the level of unsold stocks is not known yet
- *New Product Development (NPD)*: process is long and it begins two years before production (Bandinelli , Rinaldi, Rossi, & Terzi, 2013). It is difficult to standardize and control, and it generates costs of development and prototyping that cannot be always recovered by sales.

From all these considerations, it is clear that the complexity of the sector, given by both increasing of competition and expectation of the customer clearly provides a challenge to the entire management. The implications of this trend for supply chain management are clearly profound. The constant need to 'refresh' product ranges means that there is an inevitable increase of non-value-added phases represent an important part of the production process, making logistic costs significantly impact on the total cost of products.

Main research on Fashion Risk

"Risk identification map for a Fashion Retail Supply Chain" made by (Martino , Fera, Sarno, Iannone, & Miranda, 2015); defines the objectives of the supply chain and identifies risk factors related to each working phase of a fashion company. The work define the the main processes performed in a typical Fashion Retail Supply Chain are: Market trend Forecasting; Creation of Seasonal collection, Assortment, presentation & sales campaign, production orders launch , materials procurement & dispatch to production plants, finished products receiving, deliveries to customers and stores, sales to final customers, returns of unsold stock from stores and clients, outlet assortment, deliveries to outlet.

It is interested to represent the work in ***(See Figure 29, Appendix III)*** considering the processes in relation with the actor that perform them. They are referring to the description made previously. As said before, the research focus its attention to the sector risks. Doing that it took into consideration the classification of the risks according the grouping targets. In particular there are 5 main targets: Market sensitivity improvement; Brand attractiveness, Cost Reduction; Material Flow Management, Brand internationalization and market expansion risk factors ; Environmental sustainability. For each of them, the references and description are listed: The main crucial aspect are the constant research for cost reduction and optimization of times and flows, and in general it is common also in other industries. Market driven orientation is, instead, a specific issue for any demand-driven supply chain like the fashion one, which is constantly seeking for customers feedback. The spread to global market and Brand Internationalization, instead, is a common and growing issue in defining a company success. In the end, the Environmental Sustainability theme that is becoming essential for attracting the always increasing green market share. **(*See Table 30 Appendix III)***

Finally, for each target there are several risks, but it is clear that all the risk factors are strictly connected to each other and mutually influencing, then defining a simple hierarchical structure can be not enough for the clear definition of all the aspects in this complex framework. In the following table each risk is connected to a specific process, in this way all risks are mapped not only according to each target but also according to the process causing it. ***(See Figure 31 , Appendix III)*** The knowledge brought by this paper is fundamental issue on which it is possible to reflect. Considering both the targets and the processes, the identified risk map highlights many factors. The right part of processes is crucial in defining the agility of the supply chain and its ability to promptly adapt to changes in market demand. The second part, instead, wants to take into account final distribution and customers, and the correct management of factory

outlet stores in the Post-Season phase, allows to absorb the risks of demand over-estimation. This paper aims to be a tool for fashion companies, not only in the mass market but also in the luxury one, for the identification and prioritization of the complete list of risk factors affecting the correct process flow.

2.4 Digitalization in B2B Relationships

As explained in of the previous paragraph, the fashion sector is very complex and there are some important factors that affect the integration among partners and thus the introduction of digital tools, supporting the processes. First of all, there is no strong community with the purpose to facilitate the integration among actors. In the past a project called MODA ML aimed at creating a standard XML shared in the sector. The project failed due to the complexity of the language, the lack of shared standards in the sector, the high level of fragmentation and the huge investments needed. Secondly, fashion sector, managing very featured and customized products, have heterogeneous complexities to manage. On the one hand the demand variability of the customer is very high and difficult to predict because it is based on customer's tastes. On the other hand, the short time-to-market and innovation bring coordination to the top of the priorities. Despite the complexity, there are some processes between actors in the supply chain that are sustained by technologies. As it is possible to see in the Methodology section - Research Question N.1, after a deep literature review, interviews to main experts among Italian Supply Chain actors deepens the understanding of the sector. Following, findings related to the main important interviews.

The paragraph is divided into two main parts: the first one is related to the relationship between actors located upstream respect to Fashion House, the second one is located in the downstream part.

Manufacturer - Supplier

Ermenegildo Zegna. The network of suppliers, including yarn, fabric and leather manufacturer suppliers, is connected with Zegna using Web Based Solution to exchange documents in XML standard, called E-biz. Zegna is one of the first participant of the project, called Moda ML, aimed to introduce the new standard in the while industry. The platform allows the company to support the order cycle, exchange specification about the product, monitoring.

Twinset. Twinset is relying on Web Platforms to connect with the network of labor suppliers. The portal between Twinset and the Modelling office is one of the main important. It supports

the collaboration process for the development of New products: Twinset uploads technical data sheet for the suppliers, that can log in, develop models for different product, release information about the advancement of the production.

OTB. It adopted a platform with Labor suppliers. The main functionalities of the platform are the improved visibility of the suppliers over the commissions, and the possibility, for the supplier, to register the production milestone - the item of clothing that contains deficiency. OTB is relying production with labour suppliers, thus it is important for them to know the advancement of the production.

Gucci Logistic. The most important solution is a Web Based Platform. Gucci Logistic can share information with the leather manufacturer suppliers, like timetables, the work progresses expectations, distinct basic, technical information (CAD drawings or product templates). It is also able to control the production progress considering the Macro-activities; for example Cutting-assembly-packaging, and make order placements. Transport is managed by Gucci Logistics on the Tuscan territory (20%) and third parties logistic providers. Couriers are constantly monitored by mobile devices assigned to the suppliers, accessing to the collaborative transport platform. An interesting future project is regarding the communication among suppliers and couriers: suppliers will be able to communicate with the driver of the means of transport.

Benefits

The adoption of E-collaboration tool to support the process between the Fashion Houses and the labour suppliers brings lots of benefit. It increases the rapidity in exchanging information, bringing the supplier "closer" to the Fashion Houses, in order to influence the manufacturing and new product development processes, reinforcing the relationship, in terms of trust transparency and visibility, among the partners.

Manufacturer - Retailer

Intersport. Intersport has in place an EDI channel to exchange data with some of the biggest producers (Adidas and Nike). The channel is used by suppliers to send invoices and by Intersport to send orders to Cisalfa's shops and other affiliates. It is also used by suppliers to send digital transports documents, allowing the company to directly charge the received goods inside its systems with no manual control. In addition, Intersport centralized the management of goods using an existing Intersport warehouse and a web portal, that allows all the affiliates to

send, in digital format, all their orders which will be collected by Intersport. It makes the relationship between suppliers easier due to a better structured and organized process.

Rinascente. It exchanges electronically the daily sales reports, which are made available to all suppliers in EDI. Sell-in data, broken down by code, date and point of sale are valuable data for suppliers, because they allow to have an overview of daily sales and visibility on market demands. La Rinascente implements a project with Confession-suppliers, selling in the Duomo Department Shop. The aim of the projects was to eliminate traffic around the department store during the replenishment: all products are collected in a warehouse near Milan and sent to La Rinascente, using an Rfid code. On one side, it helps La Rinascente managing the traffic that all the Brand couriers would have generated around the Departement Store and, on the other side, also Brand Companies received a zero cost service, reduction of wasting time, with high visibility on the tracking and security issue.

Benefit

Manufacturer-retailer collaboration enables the two actors responding faster to the demand changes. In the la Rinascente case, sales reports, sent to the manufacturers, give fast, reliable and secure information about the demand trend. Companies like Pompea Patrizia Pepe, Gucci have long LT and production schedules are made 6 month before the market launch; so such information couldn't be useful to anticipate or change production volumes in real time. Cisalfa and la Rinascente implemented also a similar project: they decide to centralise the stocks in the warehouse, managing the inbound logistic using the same platform. The main weakness of Cisalfa and la Rinascente is their low bargaining power along the SC: their channel has a local coverage, respect to the international Fashion Houses, to be taken into consideration for other collaboration projects.

Summarizing, the main findings are described in the following graph: each arc is analysed and there is a specific description of the main digital tools used. Below there is a short recap of the peculiarities and main digital tools, characterizing the different relationship typologies.

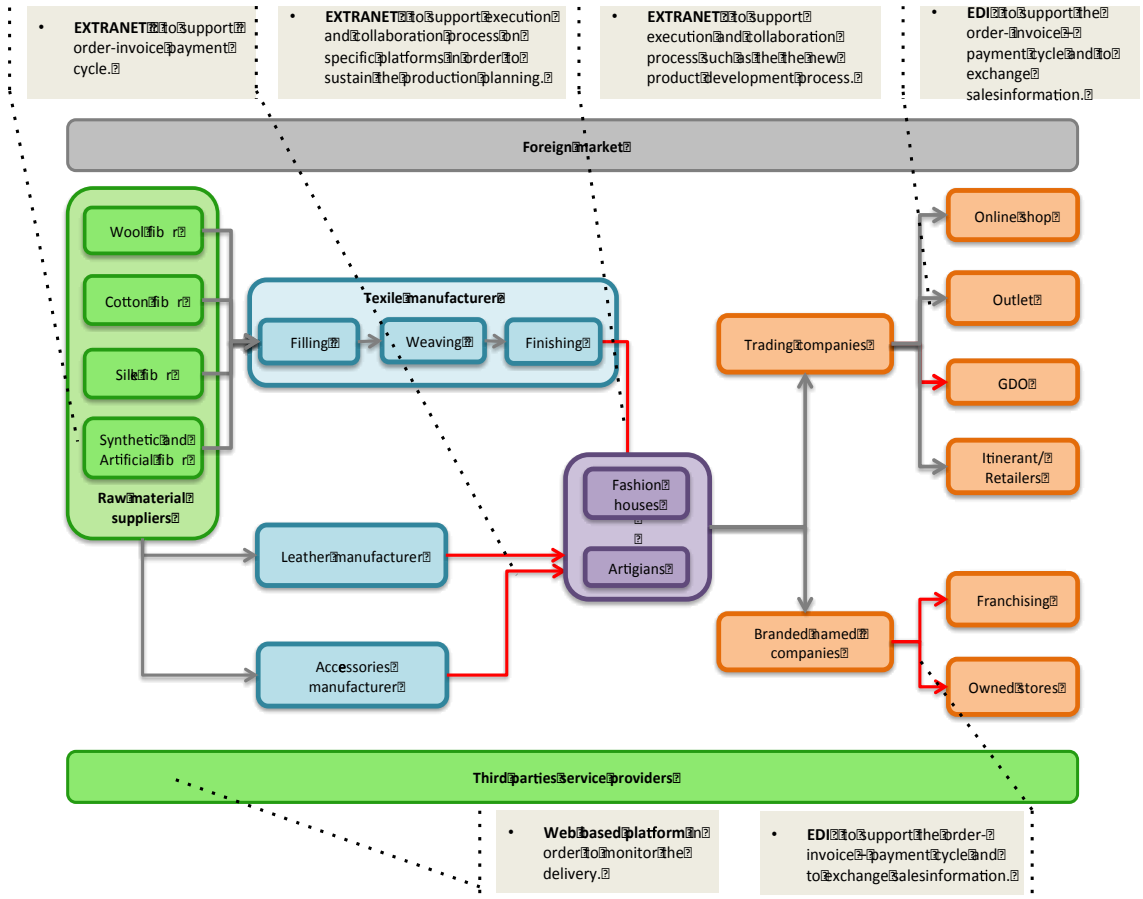


Figure 27 – Digital projects inside the Fashion Supply Chain

Supplier-manufacturer. The typology of relationship between these actors is a peculiarity of each Fashion House and it is different from company to company. The most adopted digital tool is Internet to sustain the process of order invoice payment between the manufacturers and the small suppliers. There are cases of Extranet that brings efficiency in the management of the order cycle: companies use platforms with restricted access where the suppliers can access using a login page. The main activities supported by the Platforms used by Manufacturer-suppliers are: monitoring order cycle, exchanging specification and technical data about the product; price catalogue of the suppliers; monitoring of the production process and exchanging new product development information. Small manufacturers are not always able to dictate a standard over the

supply chain players, for this reason they could be the ones that prefer to exchange order throw mail, phone or cloud systems.

Fashion houses - Owned stores. Extended ERP solution collects data from the store in a way to monitor the sales and the requests of the customers. The collection of data enable to catch new preferences and realize new collections, to better forecast future demand. To support the exchange of information with the Fashion Houses a Web Based Platform can be implemented to exchange details about product features.

Manufacturer - GDO. To exchange orders to big international chain (El Corte in Gles and Harrods), Companies use EDI standard, developing internal solution or relying on third party. EDI bring lots of benefits, especially more efficiency in the order exchange. GDO thank to it can share with Fashion Houses sales report.

Manufacturer - Third Party Logistic Service Provider. Extranet Web-Based-Platforms are used by Fashion Houses, retailers and logistic service providers, in order to keep track of the order delivery and to estimate times.

DDT and transport documents. This aspect is regarding all the actors, and it is increasing over the years. The transportation documents usually travel in digital format, but there are some cases where the paper document is still used. On the one hand the digitalization of DDT can speed up the process of goods receiving and increase the accuracy of the delivery. The documents are carried with the goods on paper to facilitate the customs control.

2.5 The Economic Perspective of the SC

To analyze the economic impact of the Fashion Industry, the economic flow, running the entire SC during year 2015, has been studied. In the analyses Accessorize, Sunglassess and textile machine businesses are not considered. The data, presented in ***Figure 24,***, are taken and confirmed form multiple documents published by Aida - Analisi informatizzata delle aziede italiane, (2017), Sistema Moda Italia, (2017), Federchimica (2017) and Unicredit per la Moda, (2017). In order to persue the objective a deep focus on the economic situation of the main Italian textile actors and districts has been further developed. The (Sistema Moda Italia, 2015)'s report has been the landmark for the whole analysis, it announced that the Italian textile industry stores 2015 with moderately growing sales (+ 0.6%) compared to the figure recorded in 2014. The sector turnover therefore amounts to 52.4 billion euros, gaining over 330 Million compared to 2014. Considering the two macro-businesses, *in 2015 the textile sector recorded 19.8 billion*

euros **(**11,3 % textile and wool industry, 4,7% cotton, 2,7% silk, 9,0% synthetic), *in while the clothing sector 32.6 billion euros.* In the table there is an immediate representation of how revenues are spread over the different businesses in terms of Revenues, number of companies and employee. This data should be compared to the size, importance and peculiarity of the business.

	Fatturato (Mil. Euro)	%	Imprese (Numero)	%	Addetti (Numero)	%
Tessile laniero	5 907	*11,3*	1 986	*4,2*	30 029	*7,5*
Tessile cotoniero-liniero	2 440	*4,7*	1 939	*4,1*	28 814	*7,2*
Tessile serico	1 403	*2,7*	469	*1,0*	12 461	*3,1*
Tessile casa	976	*1,9*	1 881	*4,0*	5 569	*1,4*
Tessile chimico e altri prodotti tessili	4 695	*9,0*	4 513	*9,6*	23 344	*5,8*
Nobilitazione tessile	4 399	*8,4*	931	*2,0*	25 456	*6,3*
Abbigliamento in tessuto	20 722	*39,5*	27 877	*59,2*	217 263	*53,9*
Maglieria	10 505	*20,0*	5 479	*11,6*	43 160	*10,7*
Calzetteria	1 352	*2,6*	1 012	*2,2*	13 875	*3,4*
Industria Tessile	19 819	*37,8*	11 718	*24,9*	125 672	*31,2*
Industria Vestiario (*)	32 579	*62,2*	35 361	*75,1*	277 095	*68,8*
Industria Tessile-Moda	**52 399**	***100,0***	**47 079**	***100,0***	**402 767**	***100,0***

Fonte: SMI su dati ISTAT, Sita Ricerca, Movimprese e Indagini interne

Figure 28 - SMI, 2014 Report.

Finally, SMI made also important consideration about the distribution channel. ***Figure 25*** shows the structure and behavior of the Retail business in Italian market, and all information has been useful to address the sector turnover to the right distribution channel. Distribution through Owned shop and franchising are definitely the most significant in terms of turnover.

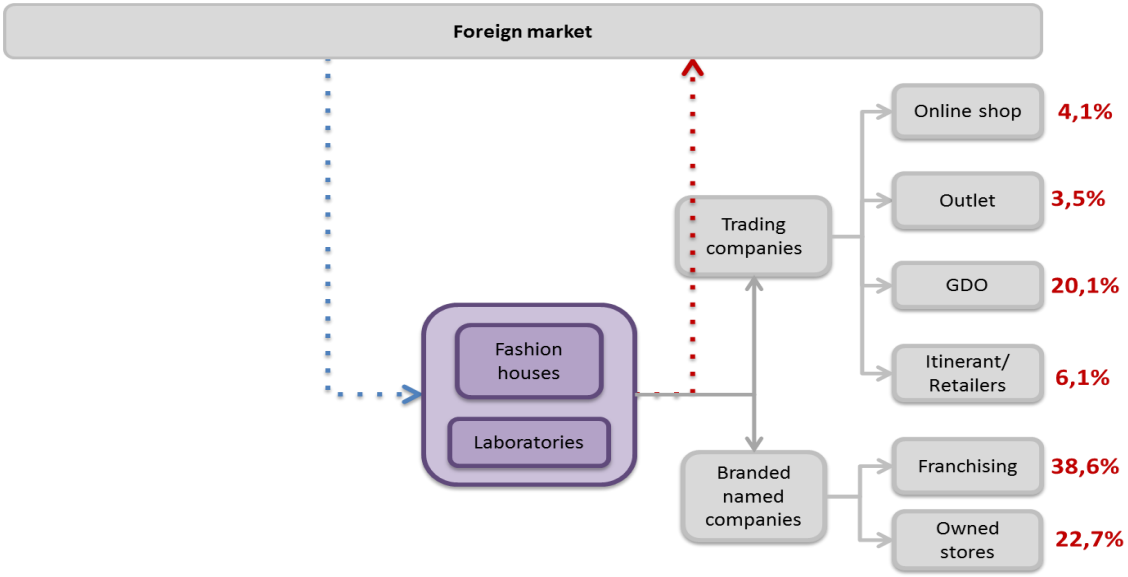


Figure 29 - Distribution Flows in Fashion Industry, 2014.

Data regarding Leather Manufacturing are taken form *Associazione Conciaria Italiana*, as well as all the previously unpublished data have been collected from the sites and reports of their respective federations.

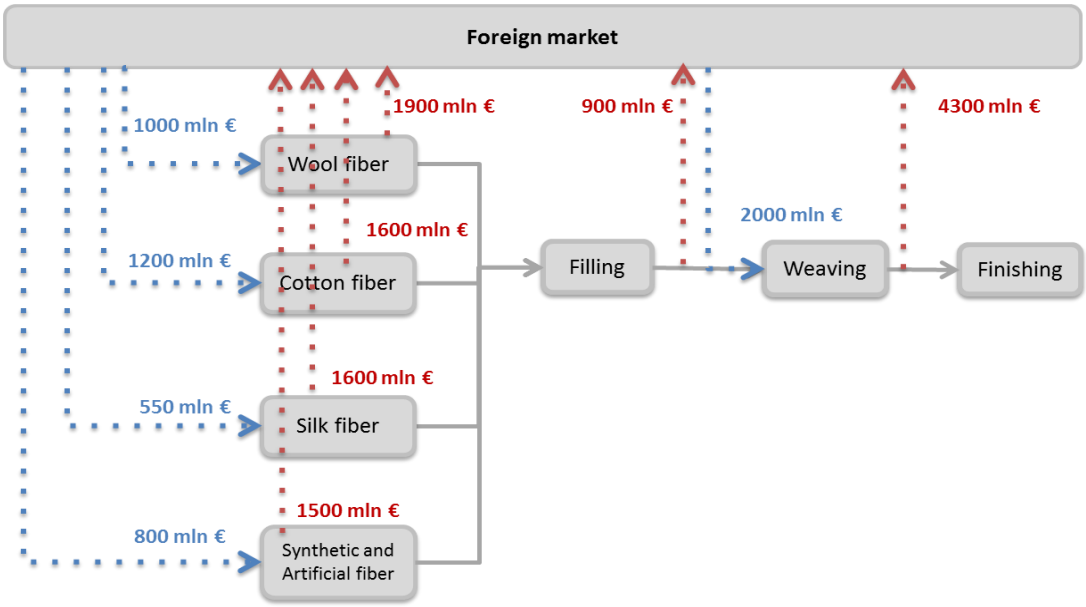


Figure 30 - Supply Side Flows in the Fashion Industry,2014.

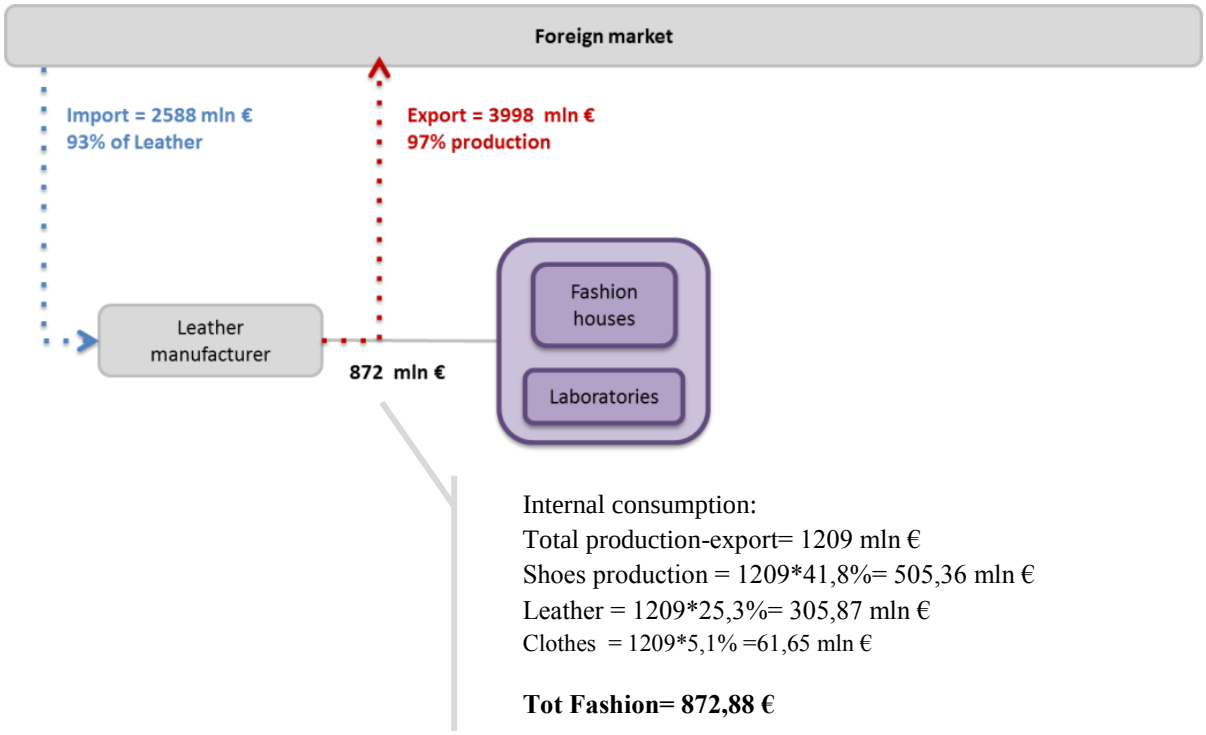


Figure 31 - Supply Side Flows in the Fashion Industry, 2014.

According to the data provided by the different sources described above, in Figure XX there is a an overview of all the main important economic flows passing the Fashion Supply Chain. Under each actor there is the reference of the Numerosity of companies.

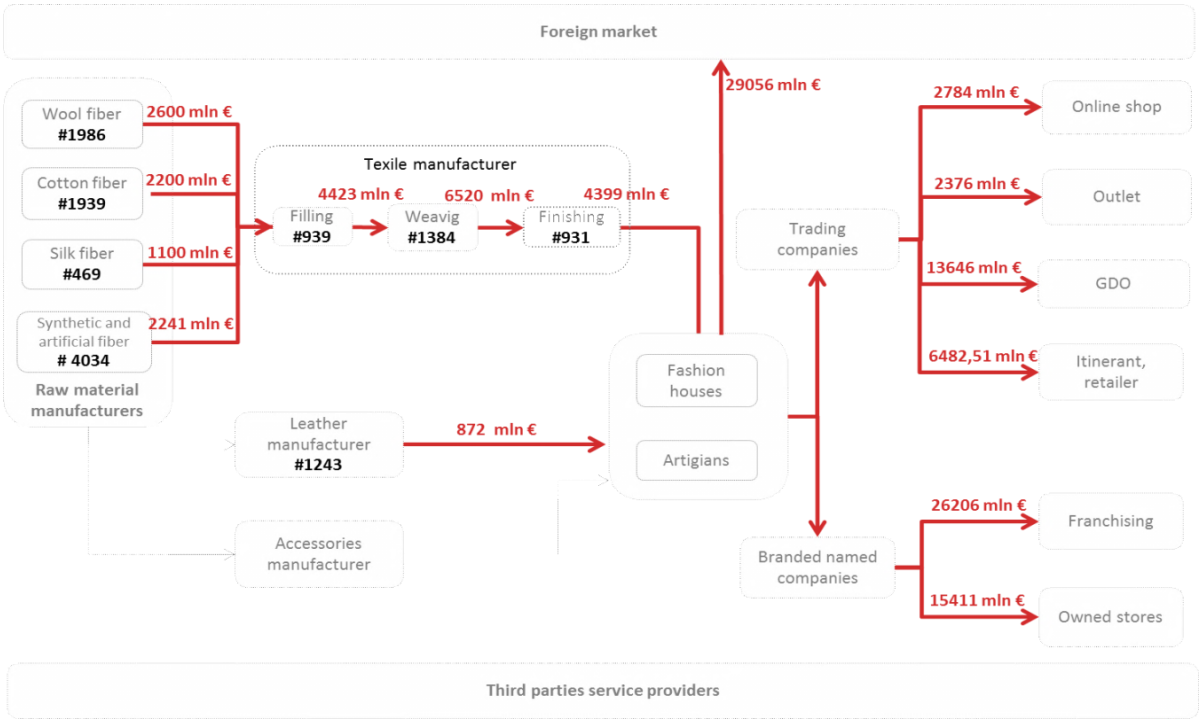


Figure 32 - Supply Chain economic perspective, 2014.

Appendix_II

	RAW MATERIAL SUPPLIER	TEXTILE MANUFACTURER	LABOR SUPPLIERS ARTIGIANS	FASHION HOUSE	RETAILER
Market trend Forecasting				In this phase In this step, several professional profiles are involved: **fashion designers, style consultants, cool-hunters, fashion bloggers and reporters.** Their main task is to analyze and forecast market trends for the following season according to main fabrics fairs, emerging street style and movie or pop star trend.	
Creation of Seasonal collection			It is a highly time-consuming activity and provides as output a wide variety of clothing items but not all of them will be then produced *Bandinelli, et al., 2013*. It is a process that can be hardly rationalized from **a management perspective by Fashion house, together with the main partners involved**, since the company needs to offer a wide variety to customers during the sales campaign.		
Assortment				The selection of the items is characterize by the mood of the seasonal collection and that will be surely recommended to the wholesalers and shown in the most representative stores. This selection is responsibility of the **Commercial Department and Styling Office.**	
Presentation & sales campaign				The collection is presented in the most important sector and after that, the sales campaign can start. In this period, **the company can record orders from wholesalers**. All the clients undergo a financial assessment and then their orders can be approved after the solvency check. Most of these orders may be affected by some changes even after conclusion of this campaign	
Production orders launch				This phase is almost **contemporary to the previous one.** Orders already forwarded to production for which there is an insolvency problem, are hold as "suspended orders". They will be not delivered to the client but will be made available for other clients' orders even during the selling season.	
Materials procurement & dispatch to production plants		It is supposed that supply of fabrics and accessories is directly borne by the main company. It may happen that this process is performed by suppliers according to customer's specifications. In this phase, often material do not pass through the central warehouse but are directly delivered from **fabric's suppliers to producers.**			

Finished products receiving				When receiving finished products in the **Producer**'s central warehouse or logistic center, two main checks are performed: (i) quantity check; (ii) quality check.	
Deliveries to customers and stores				The personalized kits of items to send to **stores and clients** are prepared by warehouse staff or, in some cases, by **producers** themselves. From one side, it results in a leaner material handling process, but on the other, it leads to not optimized transports, since some packages are half-empty.	
Sales to final customers				It is the actual selling season. During this period no other production orders are launched. In order to meet actual demand, **company can ship to stores** on-hand inventories, such as those items stuck in the warehouse due to the "suspended orders".	
Returns of unsold stock from stores and clients				At the end of the selling season, the **central warehouse receives unsold stocks** both from stores and wholesalers according to specific commercial agreements. This step is similar to the "Finished products receiving" one since both quality and quantity check must be performed and the same overloading problems may arise.	
Outlet assortment				**Returned items** must be refurbished and priced with **outlet discounts**. In some cases, in order to offer a wider assortment and attract customers, the company launches a specific production of items destined to outlet stores, using left-over fabrics.	
Deliveries to outlet				This step is similar to the "**Deliveries to customers and stores**" one even if quantities to handle are significantly lower.	

Figure 33- Risk identification map for a Fashion Retail Supply Chain

TARGET	REFERENCE	DESCRIPTION OF TARGET CHOICE
Market sensitivity improvement **Brand attractiveness**	(Cillo & Verona, 2008) (Carniene & Vienazindiene , 2014)(Heuer & Brettel ,2015) (Tajuddin, 2014).	Fashion products are characterized by high volatility and unpredictability *Wang, et al., 2012,* and their consume is highly impulsive and subjective *Newman & Foxall, 2003.* Demand forecasting process determine the ability to catch customer's tastes and future behavior, there is the need to draft forecasts well ahead of the selling season with of a reactive approach. The uniqueness of the fashion products, whose success depends on cultural and emotional aspects, may lead to errors and risks are several and mainly related to the Pre-Season phase.
Cost Reduction **Material Flow Management**	De Toni and Meneghetti (2000); (Heckmann, 2015) (Marufuzzaman, 2010) (Tang, 2011)	The Cost Reduction objective can be outline from *Time* perspective, and Material Flow management. The first one is an important factor due to the time-to-market growing relevance. It focuses the attention on the reduction of orders management, material handling, collection development and transports, allowing to enter the market with the right product at the right time. The second one, instead is an important aspect, in a contest of growing complexity in the supply chain. An appropriate material movement, supported by a continuous information sharing among all actors, enables flexibility and visibility during all the processes.
Brand internationalization and market expansion risk factors	(Guercini & Runfola, 2010) (Caniato , 2014);	Continuous product and process innovation allows to reach requests of different customer targets and increase service level. International expansion plan, in addiction, allows to access to new markets and increase brand prestige.
Environmental sustainability	(Li, 2014); (Caniato , 2014); (Yonggjian, 2014)	The attention to Environmental Sustainability aspect is growing and growing both for customer and companies. The content encompasses from production to transports and recycling. Companies are launching sustainable initiatives, such as Levi's with its entire Spring/Summer 2013 collection in recycled PET or H&M with its use of sustainable materials, reduction of transport emissions and of electricity use.

Figure 34 - Source "Risk identification map for a Fashion Retail Supply Chain".

TARGET	RISK FACTOR	Market trend Forecasting	Creation of Seasonal collection	Assortment	presentation & sales campaign	Production orders launch	Materials procurement & dispatch to plants	Finished products receiving	Deliveries to customers and stores	Sales to final customers	Returns of unsold stock from stores	Outlet assortment	Deliveries to outlet
Market sensitivity improvement	Long-term horizon	x											
	Inefficient item classification:	x											
	Unstable demand	x											
	Market heterogeneity	x											
	Different purchase behavior in each area	x											
	Competitive initiatives	x											
	Lack of historical data for fashion items,	x											
	Absence of in-store marketing analysis	x											
	No comparison with fabric suppliers	x											
	Many actors between company and market			x									
	Bullwhip effect					x							
	"on-off" purchases					x							
	No record of lost sales									x			
	Different contractual terms for returns from wholesalers,				x								
	Lack of information from wholesalers										x		
	Few different suppliers					x							
	Exclusive use of "up-front" buying,							x					
	No use of real demand as replenishment driver								x				
	No sold/foreseen deviation analysis								x				
	Replenishments solely based on stocks								x				
Brand attractiveness	Many new product launches failed		x										
	Poor offer differentiation		x										
	Excessive focus on continuative items		x										
	Customization in international markets		x										
	Design of only two collections a year		x										
	Poor diversification of sales channels			x									
	Wholesaler's reputation inconsistent with brand image				x								
	Deviation between offered and expected product quality,						x						
	In-store Out-of-Stock								x				
	In-store shopping experience								x				
	Lack of "key" sizes in stores								x				

	Low service level								x				
	Inefficient advertising campaign									x			
	Limited assortment in outlet stores											x	
Time based competition	Inefficient interaction styling office/marketing office		x										
	Inefficient interaction styling office/suppliers		x										
	Delays in closing sales campaign				x								
	Increase in distributors orders				x								
	Forecasting error for some items,					x							
	Process misalignment between actors						x						
	Production and delivery of the whole purchase lot before the selling season						x						
	Production of more items by a single supplier												
	Poor "virtual integration						x						
	Orders launch close to the selling season						x						
	Long production lead time						x						
	Delivery delays raw materials						x						
	Sole use of foreign suppliers							x					
	Wrong delivery scheduling							x					
	Delays in transports and import/export procedures							x					
	Use of low cost transports							x					
	Limited storage/material handling capacity							x					
	Inefficient item division in warehouse							x					
	Limited storage/material handling capacity and No automated warehouse							x					
	Forced markdowns due to late deliveries or due to over-stock								x				
	Lost sales due to stock out									x			
	Forced mark down due to over-stock									x			
	Items exchange between stores:									x			
	Overload at the end of the season,										x		
	Difficult returns identification without a detailed archive										x		
	Deviations between delivery notes and actual deliveries										x		
	Returns of entire lots for high defective percentage										x		
	Deliveries in single solutions												x
Material flow management	No accurate quality control in Labor Suppliers/suppliers						x						
	Limited flexibility						x						
	Limited production capacity						x						
	Excessive defective percentage						x						
	No optimization due to strong differentiation of orders						x						
	No control on production progress status						x						
	Poor raw material quality							x					
	Need to optimize lots delivered by different suppliers							x					
	Overload for receiving entire production lot:							x					
	High safety stock due to unreliable demand forecast							x					

	Errors in clients assortment							x					
	Forced markdowns due to late deliveries								x				
	Misalignment between virtual and physical inventory								x				
	Lost sales due to stock out									x			
	Forced markdowns due to over-stock									x			
	Items exchange between stores									x			
	Overload at the end of the season										x		
	Difficult returns identification without a detailed archive										x		
	Deviations between delivery notes and actual deliveries										x		
	Returns of entire lots for high defective percentage										x		
	Deliveries in single solutions												x
Brand internationalization and market expansion	Unstable political/economic conditions in target markets	x											
	Unappropriated selection of stores location	x											
	High number of international competitors	x											
	poor diversification from competitor's products,		x										
	Wrong selection of international distributors				x								
	Inability to expand clientele				x								
	No sharing procedure for sales plans by main company					x							
	Weak infrastructures in new markets								x				
	Inadequate logistic system for international expansion									x			
	Poor brand recognition abroad									x			
Environmental sustainability	Lack of attention to "green" consumers	x											
	No use of organic fabrics, recyclable materials or local resources (eco-design):		x										
	Limited use of excess fabrics						x						
	No IT support to production						x						
	Long distances between raw materials and finished products producers						x						
	No assessment/control on suppliers environmental policies						x						
	Excessive production waste						x						
	No packaging recovery/recycling							x					

Figure 35 - Source "Risk identification map for a Fashion Retail Supply Chain

3. METHODOLOGY

3.1 Methodology introduction and research questions

The deep literature analysis, pursued through *Section 1 and 2*, leads the study to the definition of the research question:

"Is it possible to identify the best strategic digital tool to support Fashion Houses and Labor Suppliers' relationship in the Fashion Industry?"

The research question can be translated into one main research objective:

"Developing a holistic framework to identify the Fashion Houses – Labor Suppliers' strategic digital tool' that best fits with the characteristics and the aims of the relationship".

The research objective has been further deployed into three main sub-objectives:

- *Research Question N.1 - What is the E-collaboration adoption level in the B2B relationship in the Fashion Industry?*
- *Research Question N.2 – Which are the factors that affect the e-collaboration adoption, in the Fashion Houses-Labor Suppliers relationship?*
- *Research Question N.3 – Which are the optimal technologies to be adopted for the specific combination of the variables?*

The framework aims to be as more general as possible in order to ideally be used at the international level.

Research Question N.1 was investigated in parallel with the *Research Question N.2 and N.3.*

- *Research Question N.1* has been answered with the contribution of Politecnico di Milano - Observatory of *"Fatturazione elettronica e ecommerce B2B",* in a project with the aim to investigate the level of adoption of digital tool to support the processes inside the Fashion supply chain. The contents and main findings of the work are reported in ***Section 2***, and it touches the following points:
  - Analysis of the actors of the Fashion Supply Chain;
  - Digitalization perspective in B2B Relationships;
  - The economic perspective of Fashion Supply Chain;
  - The main characteristics and challenges of the Fashion SC;
  - Main Fashion Supply Risks.

In addition to a deep literature analysis**,** Interviews to the Fashion Supply Chain experts and technicians are the main contributions to the successful realization of the whole research. The interaction with them gave the research strong knowledge both for the problem setting and the problem solving process. The following table, ***Figure 33,*** reports a complete overview of the interviewees, their role, the Company they work for and the typology of business.Interviews gave a broad overview of the Fashion world. The majority of the interviews were arranged with the main Italian Fashion Houses, Retailers and Textile manufacturers. The selection of the exponent of the company was focused on the main experts from purchasing or IT department in order to rely on precise information on the supply chain structure and on the tools to support the transactions. After each interviews, an overview of the Company interviewed has been implemented, ***(see Appendix_V***), reporting two main aspects: the structure of the supply chain and the main digitalization projects implemented, with their benefits and criticalities.

The questionnaire used for the interviews is reported more in detail, in ***Appendix III,*** and it touch the following points:

- *General introduction of the company:* presentation of the company in order to catch data about the dimension, the typology of activity conducted and the main production lines.
- *Structure of the supply chain:* information about the networks around the company's suppliers and customers. In particular according to the variables under investigation the description of the main suppliers and the focus on the strength of relationship with them.
- *Level of digitalization:* internal and external digitalization projects. The objective of the analysis is trying to extract the processes supported by the tools.

- *Benefit and criticalities:* main advantages and criticalities introduced by the use of the technology to support the activities in terms of improvements of the efficiency and effectiveness of the different tasks. A deep analysis is also conducted to analyse the main obstacles and the main risk associated in the collaboration activities and the creation of the digital culture able to include all the actors in the supply chain.

Once all data are collected, we build some tables with specific schemes to follow in order to get a rapid access to the main relevant information, in the subsequent phase of dataset building.

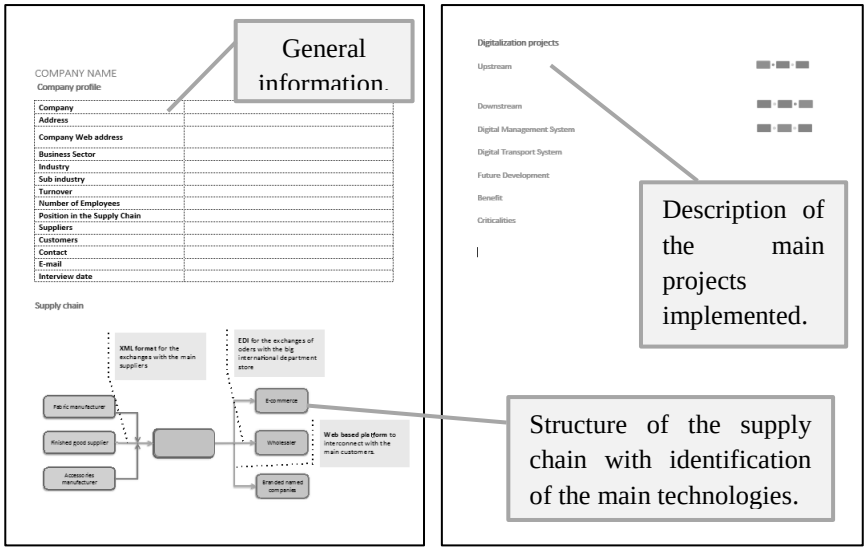


Figure 36- Interviews output.

Company	Interviewee	Role	Typology	Interview date
Canali	Interviewee_1	CIO	Manufacturer	10/05/17
Clerici Tessuto	Interviewee_2	CIO	Manufacturer	31/03/17
Ermenegildo Zegna	Interviewee_3	IT manager	Manufacturer	10/04/17
Fashion Box Spa	Interviewee_4	CIO	Manufacturer	31/03/17
Giovanni Versace Spa	Interviewee_5	IT manager	Manufacturer	25/05/17
Golden Lady	Interviewee_6	Purchasing Director	Manufacturer	07/04/17
Gucci Logistic Spa	Interviewee_8	Logistic manager	Manufacturer	30/03/17
Hugo Boss	Interviewee_9	Operations Senior manager	Manufacturer	04/05/17
Il Gufo	Interviewee_10	IT Manager	Manufacturer	08/05/17
Intersport spa	Interviewee_11	CIO	Retailer	11/04/17
La Perla	Interviewee_12	IT manager	Manufacturer	07/04/17
La Rinascente	Interviewee_13	CIO	Retailer	07/04/17
Lotto Sport	Interviewee_14	IT manager	Manufacturer	10/05/17
Manifattura Mario Colombo	Interviewee_15	Operations director	Manufacturer	10/05/17
Mantero seta Spa	Interviewee_16	CFO	Manufacturer	30/03/17
Miroglio Fashion	Interviewee_17	CIO	Manufacturer	10/05/17
OTB	Interviewee_18	Chief digital officer	Manufacturer	11/04/17
Parah	Interviewee_19	EDP manager	Manufacturer	10/04/17
Patrizia Pepe	Interviewee_20	IT manager	Manufacturer	03/04/17
Pompea	Interviewee_21	Function director	Manufacturer	03/04/17
Twin-set	Interviewee_22	Organization director	Manufacturer	31/03/17

Figure 37 - Interviewees Overview.

- *Research Question N.2 and N.3* 's process is explain from paragraph 3.2.

To pursue the two research objectives, the research design has been deployed according to the following scheme:

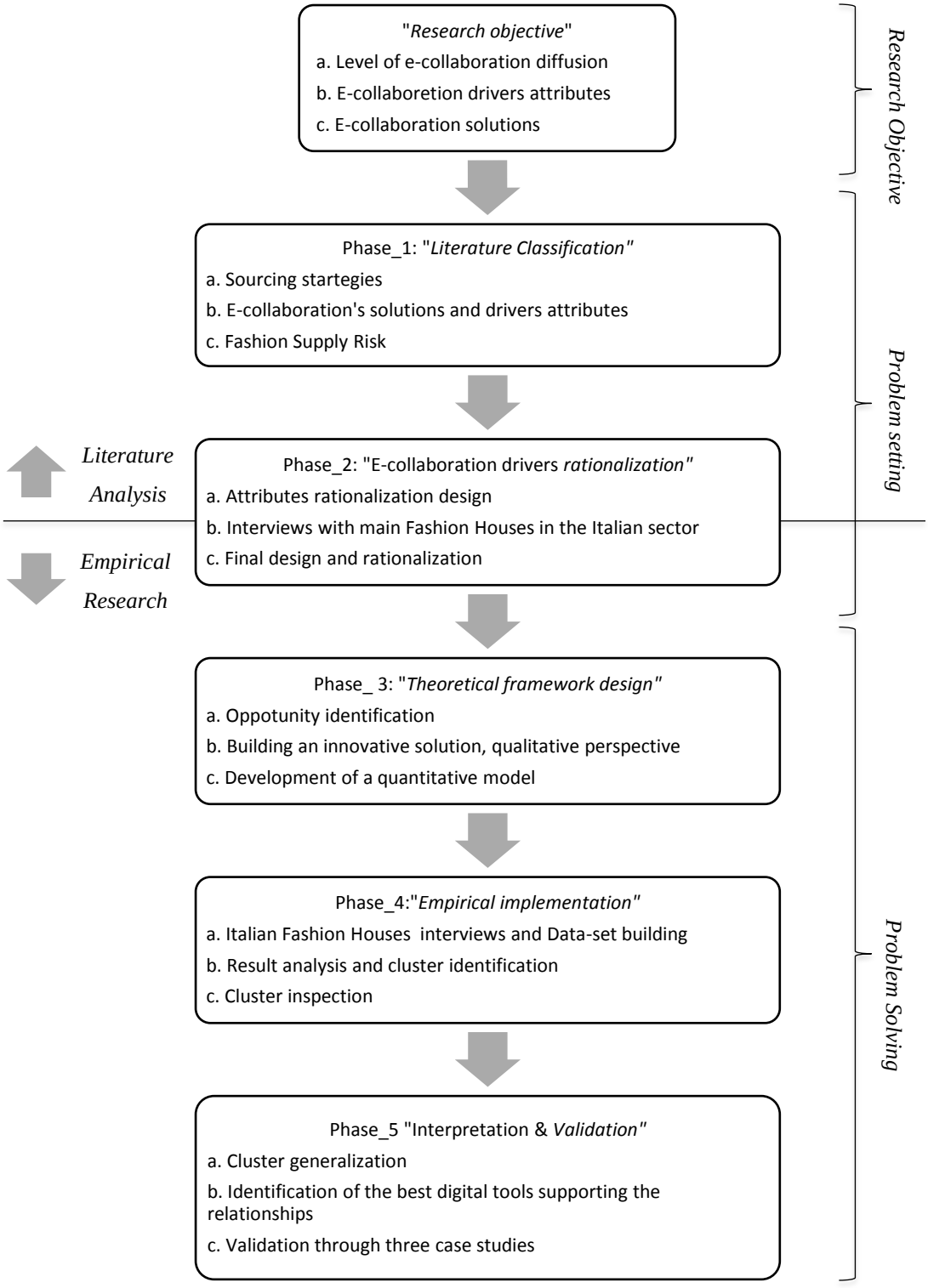


Figure 38 – Structure of the research project: a methodology perspective

Figure 30 describes the steps of the analysis. In the right side there is the distinction between problem setting and problem solving, the aim of the division among two macro phases is to give to the reader a further logic understanding. Problem setting process aims at analysing past researches available in literature in order to settle a clear classification of the already classification findings. The output of the problem setting process is a rough qualitative model which gives the researchers a clear overview, in a synthetic and exhaustive way, of the "state of the art". The goal of the problem solving process is instead to explain how the area of improvement have been identifies and how the innovative solution has been deployed.

The following table describes the purpose of each phase, the research objective addressed, the method through which each phase has been approached, the kind of pursued activity and the section of the thesis in which it has been deployed:

Problem Setting			
Phase	***Research Questions***	***Method***	***Thesis section***
"Literature classification"	*1,2*	*Literature analysis: Supply Chain and Collaboration contents, with a particular focus on e-Collaboration and Fashion Industry.*	*1,2*
"E-collaboration drivers rationalization"	*2*	*Literature contribution; Interviews with Fashion experts*	*4*
Problem Solving			
Phase	***Sub-objective***	***Method***	***Thesis section***
"Theoretical framework design"	*2*	*Identification of areas of improvement: a lack of researches in the literature;*	*4*
"Empirical implementation"	*2,3*	*Interviews with Fashion industry experts. Literature contribution*	*5*
"Interpretation & Validation"	*3*	*Loro Piana, Dolce &Gabbana and Moncler case studies*	*6*

Figure 39- Problem setting and problem solving methodology structure.

3.2 Problem setting

The objective of this session is to formalize in a structured way the knowledge obtained through literature analysis of the research, representing the "state of the art" related to the analysis of the Fashion Supply Chain and the e-collaboration implications.
Phase_1 wants to provide a structured classification of the literature overview, and Phase_2, pursues a rationalization of the knowledge. The output of the problem setting process is the base for the development of an innovative empirical solution.

3.2.1 Phase_1: "Literature Classification"

In the first phase that is related to the problem setting, the literature review focuses the attention on the main important themes around the topics of sourcing strategies and e-collaboration. A preliminary analysis using as major sources: the web in particular Politecnico di Milano portal for the selection of the main scientific publication. In the literature overview ***Section 1,*** it has been reported a clear chronological analysis of researches among E-collaboration drivers attributes and technologies solutions. That overview gives an effective starting point of the analysis. First of all the identification of the main keywords around the topic was performed, the most important ones are: Supply chain, fashion, Textile supply chain, e-supply chain, e-collaboration, e-collaboration, EDI, Internet EDI, Extranet, VMI, CPFR, XML.

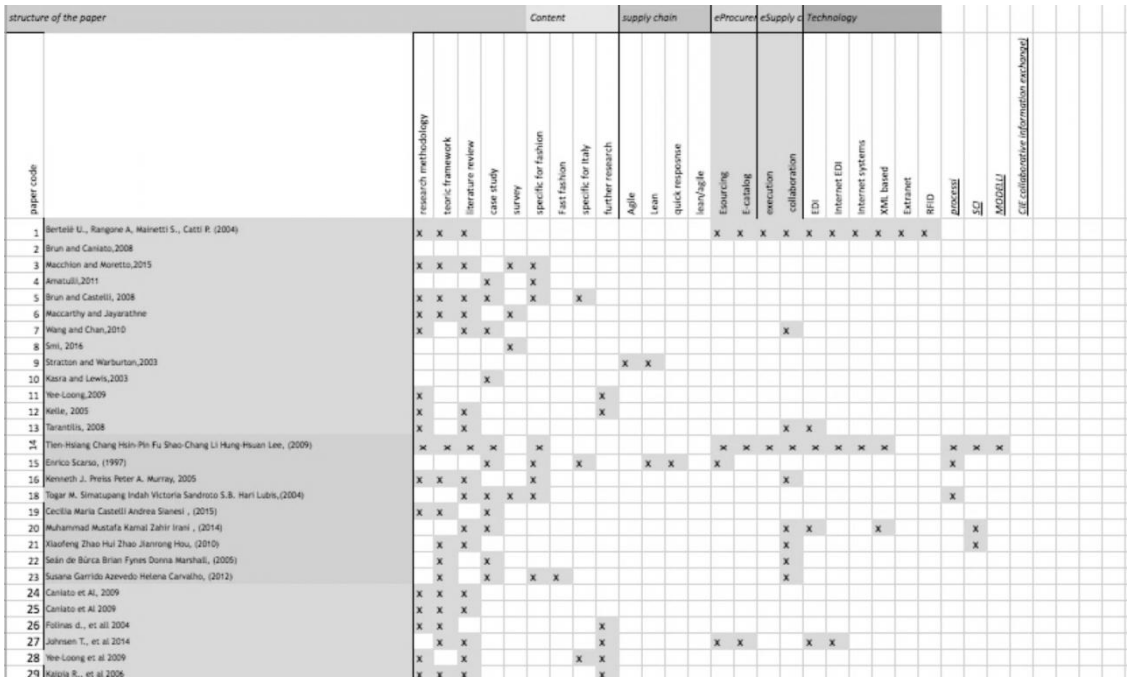
Once the main articles were found, a spread sheets in Excel file was built:

- One spread sheet contains all the important information about the articles such as the author, the journal of publication and each paper is identified in an univocal way by a specific code.

CODE	Main content	Author	All the authors	Year of publication	Title	Publisher	Magazine	Number and pages	Abstract	Typology	Keywords	Title	Quotes
xxx													
xxx													

Figure 40 – Papers' classification

- The second spread sheet was devoted to the main articles, identified by a code. They are analysed according to the main content, for example industry taken into consideration, technologies involved, models of collaboration, B2b processes and sourcing strategies.



structure of the paper		Content								supply chain				eProcurem		eSupply c	Technology											
paper code		research methodology	teoric framework	literature review	case study	survey	specific for fashion	Fast fashion	specific for Italy	further research	Agile	Lean	quick response	lean/agile	Esourcing	E-catalog	execution	collaboration	EDI	Internet EDI	Internet systems	XML based	Extranet	RFID	process	SCI	MODELLI	CIE collaborative information exchanged
1	Bertelè U., Rangone A., Mainetti S., Catti P. (2004)	x	x	x											x	x	x	x	x	x	x	x	x	x				
2	Brun and Caniato,2008																											
3	Macchion and Moretto,2015	x	x	x		x	x																					
4	Amatulli,2011				x		x																					
5	Brun and Castelli, 2008	x	x	x	x		x		x																			
6	Maccarthy and Jayarathne	x	x	x		x																						
7	Wang and Chan,2010	x		x	x												x											
8	Smi, 2016					x																						
9	Stratton and Warburton,2003										x	x																
10	Kasra and Lewis,2003				x																							
11	Yee-Loong,2009	x								x																		
12	Kelle, 2005	x		x						x																		
13	Tarantilis, 2008	x		x														x	x									
14	Tien-Hsiang Chang Hsin-Pin Fu Shao-Chang Li Hung-Hsuan Lee, (2009)	x	x	x	x		x								x	x	x	x	x	x	x	x			x	x	x	
15	Enrico Scarso, (1997)				x		x		x			x	x		x										x			
16	Kenneth J. Preiss Peter A. Murray, 2005	x	x	x			x											x										
17	Togar M. Simatupang Indah Victoria Sandroto S.B. Hari Lubis,(2004)			x	x	x	x																		x			
18	Cecilia Maria Castelli Andrea Sianesi , (2015)	x	x		x																							
19	Muhammad Mustafa Kamal Zahir Irani , (2014)			x	x													x	x			x			x			
20	Xiaofeng Zhao Hui Zhao Jianrong Hou, (2010)		x	x														x							x			
21	Seán de Búrca Brian Fynes Donna Marshall, (2005)		x		x													x										
22	Susana Garrido Azevedo Helena Carvalho, (2012)		x		x		x	x										x										
23	Caniato et Al, 2009	x	x	x																								
24	Caniato et Al 2009	x	x	x																								
25	Follnas d., et all 2004	x	x							x																		
26	Johnsen T., et al 2014		x	x						x					x	x			x	x								
27	Yee-Loong et al 2009	x		x					x	x																		
28	Kaipia R., et al 2006	x	x	x						x																		

Figure 41 – Classification table 2

Once the main environment of the analysis has been clarified, the literature analysis moved head, deepening the following topics:

- Supply Chain Management Theories;
- Sourcing Strategies;
- The e-collaboration phenomena inside the literature;
- The main technologies that enable the realisation of collaboration among business actors;
- The characteristic of the relationship that brings business partners integrated;
- The main actors and the main processes in the fashion supply chain.

By the preliminary literature analysis, it was immediately clear that there is a room of production of new knowledge. In particular, there is the necessity to create a *framework specific for the Italian fashion sector, able to explain the Fashion Sourcing strategy and the adoption of e-collaboration tools to support it.*

In addition, the literature review focuses the attention on *Kraljic Portfolio Model*, that was used to reflect over the main strategies used by the firms, to manage the supplier-base. It takes into consideration the Supplier Risk and the Importance of Purchase. In the original model, there are practical implementation problems, criticized by many researchers: the model focuses on given 'items' and not supplier relationships. For this reason, considering the specific e-collaboration technologies as the output of the research, the focus moves toward the definition of the Fashion Supply Chain Risks and Relationship attributes, that could influence the choice of the adoption. Moreover, the interviews of the Fashion companies highlighted a critical deficiency related to the influence of e-collaboration adoption between Fashion Houses and Labor Suppliers. From this focus the Risk of the Supply network and the strength of the relationship are two important macro attributes influencing E-collaboration tools adoption (Chong & Ooi, 2009), (Michelino, Bianco, & Caputo, 2008), (Garcia-Dastague & Lambert , 2005) (Chatterjee & Ravinchandran, 2004).

The basis of the model is a re-interpretation of *Kraljic Portfolio Model* considering its two main macro variables, with an innovative focus on the Relationship dynamic and The Fashion Supply Risk. The correlation between the macrovariable and the e-collaboration is proven by a deep analysis of the literature and explained in **section 4.** For these reason the macro-variable can be translated into: Strength of the Relationship: it includes all the attributes related to the Strength of the Relationship among two partners and enabling the adoption of e-collaboration; and Fashion Supply Chain Risk, including all the Risk factors affecting the Fashion Supply Chain.

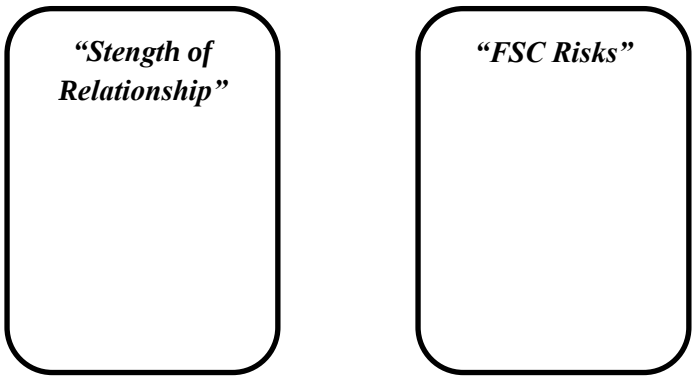


Figure 42 - Theoretical structure of the literature classification

3.2.2 Phase_2: "Choice of attributes rationalization"

This phase takes part of problem setting phase. The two main topics, highlighted in the paragraph before, are taken independent into consideration:

Strength of the Relationship

First of all, the main features of the relationship between *buyer and supplier* are investigated. In particular, all the e-collaboration models were reviewed. The analysis of the literature brought to attention many factors that was considered important to strengthen the integration between business partners. The main goal of this step was to sum up them, building a table with definitions and sources.

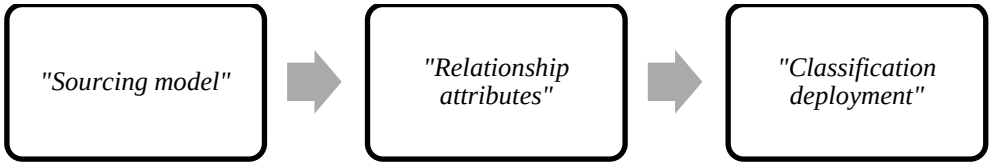


Figure 43 - Strength of Relationship attribute identification Process

Fashion Supply Chain Risk

After having analyze all the factors linked to the supply chain relationship, the model wants to assess how risk is spread in the Fashion Industry. For this reason a deep research on Risk management, specific for the Fashion Industry, has been performed. The activity was conduct focusing on another relevant topic: the main causes of risk in a buyer –supplier relationship that could be sorted out by the use of digital tool. Also in this part of the analysis we have conducted a deep literature review trying to identify the causes of risk in a relationship, focusing our attention on the fashion supply chain. All the Risk factors were listed that were associated to particular processes that included all the supply chain. For this reason, all Risk factors are grouped by the processes they are associated to.

Figure 44 - Risk identification map process

The output of Phase_2 is an exhaustive and synthetic model which represents the correct rationalization of the micro-variables, coming from the literature analysis, converging into main macro-variables. The following graph reports the shape of the output of Problem setting phase:

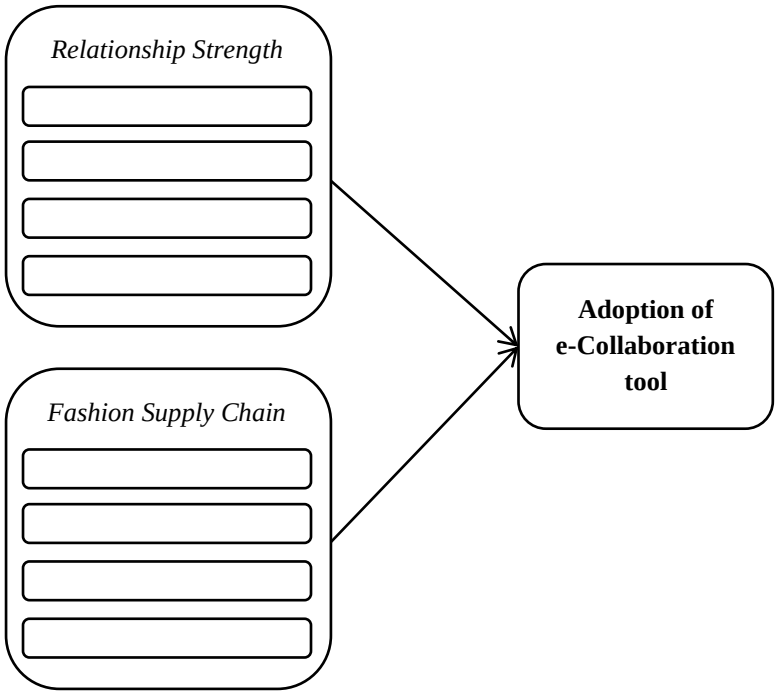


Figure 45 - Problem setting Output

3.3 Problem Solving

The problem setting process goal is to start from the rationalized knowledge in order to build an innovative solution to address the research objective. In the first part, the second sub-objective was targeted, it will provides an innovative solution thought the design of a theoretical framework. It includes the relationship between Supply Risk and the Relationship Strength with the adoption of e-collaboration. Afterwards how the theoretical framework can be applied to empirical cases (specifically, to the Italian Fashion industry, considering the relationship Labor Suppliers-Fashion Houses) how results have been analyzed will be described in ***Section5.*** Finally the validation of the theoretical framework with empirical research were validates through three case studies.

3.3.1 Phase_3: "Theoretical Framework Design"

The objective of this section is to propose an innovative theoretical framework describing the peculiarities of the E-collaboration between Fashion Houses and Labor Suppliers.

One of the major findings from literature is the absence of a structured research on the adoption of e-collaboration tool supporting the B2B collaboration, in the Fashion Industry. This outcome opens room of improvement for the theoretical model through the match of due important variables, Relationship Strength and Supply Chain Risk, that both influence the choice of e-collaboration adoption.

As previously described, the focus on Labor Suppliers-Fashion Houses relationship, from the beginning, give us a rationalized model, which described the risk and peculiarities of such relationship. The attributes choice, related to the Strength of relationship, are instead proved and confirmed by the Interviewees and Literature reviews, and are referred to a general industry. This second group of attributes are matched using an important model, studied in literature. From now on, the developing of an innovative framework will include the continuous interaction with fashion experts, together with the literature evidences. We assess that there is a proportional dependence between the grouping attributes and the macro-variable, and so between the macro variable and the E-collaboration adoption; to do that we used several literature paper that have previously studied and verified each relationships.

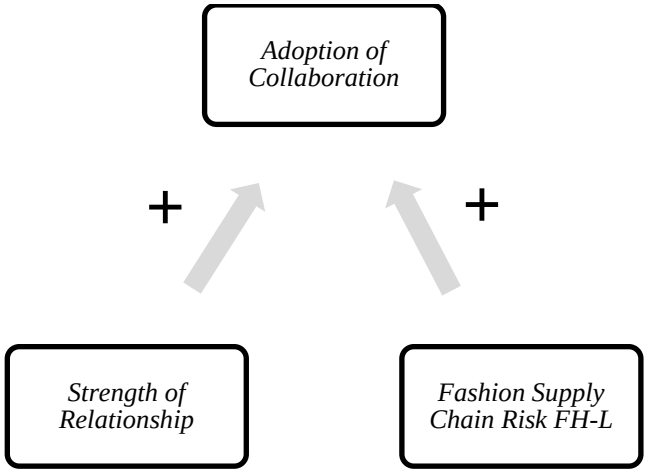


Figure 46 - Theoretical final shape of the innovative theoretical framework.

In this way, Strength of Relationship and Fashion Supply Chain Risk FH-L are the two independent variables of the model, and the adoption of Collaboration tool will become the dependent variable. To best describe the model, a Matrix has been considered the best tool: the independent variable become the axes and the dependent variable the result. The model is analyzed and created both using qualitative and quantitative reasoning. For each macro-variable, all the micro-variables are considered treated variables. In other words, the value of the macro-variable, that is the value on each axe, is calculated as a medium of the grouping variables' score. This decision is driven by the lack of literature paper, that explained the relative weight of the variable in relation to the Objective in analysis, and the lack of statistical assessment, due to the number of interviews performed. The idea to use the Analytic hierarchical process (AHP), Thomas L. Saaty to assess the weight of each variable loses importance in this contest: the assumption would be qualitative and the iteration too complex for the supporting material at our disposal.

**From this point on Fashion Supply Chain Risk FH-L will be called Relationship Risk.*

3.3.2 Phase_4: "Empirical Implementation"

After the development of the theoretical framework, this phase wants to perform the empirical implementation. The following phases let the process create, from a dataset, some Clusters of companies, characterized by similarities in the adopted digital tools. For this reason, the output of this phase will be the starting point for the development of the model.

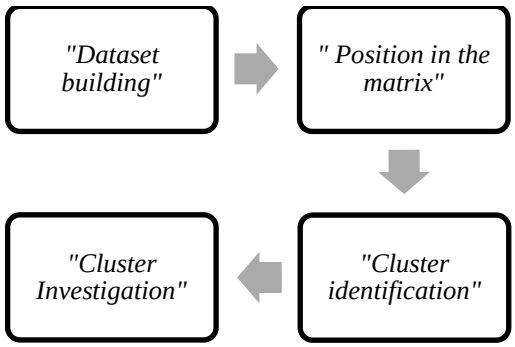


Figure 47 – Structure of Phase_4.

"Dataset building"

For each company, the micro-variables are analyzed and assessed in *a scale from 1 to 3 points*, thanks' to information collecting from the interviews.

" Position in the Matrix"

Matching the score of each axe, each company was placed in the matrix. An Excel file was the major support for this operation, because it provides good sensitivity of each variable on the final output.

"Cluster Identification"

During the Implementation phase, Companies are positioned in the matrix creating clusters. It was very interesting that each one represents companies with similarities regarding digital culture, technological tool and technological and relationship advantages and criticalities.

"Cluster investigation"

For each cluster of companies, the best digital tools supporting the Relationship Fashion Houses - Labor Suppliers are identified.

3.3.3 Phase 5: "Interpretation & Validation"

This phase aims to interpret and validate the model, strengthen the quality and validity of results, by highlighting two important issues. First of all, the major assumptions of the theoretical framework is further checked, by investigating what the model is able to describe, its strengths and improvement. Secondly, the relationship between the empirical result and the

Companies' actual situation, regarding e-collaboration tools adopted. The analysis of Phase_5 is expected to provide two major results:

- a structure analysis of the major characteristics of the developed innovative framework;
- a further investigation of the reasons standing behind the output of the empirical implementation in terms of e-collaboration.

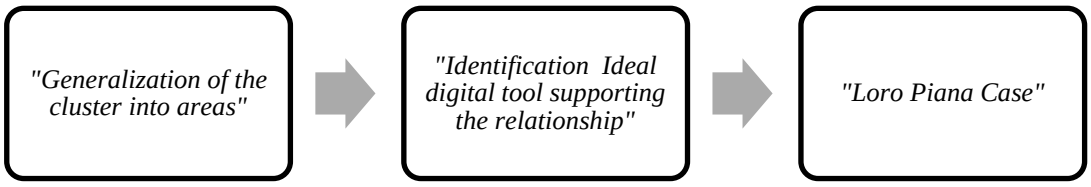


Figure 48 – Structure of Phase_5.

"Generalization of the cluster into areas"

The area, formed by the two axes, was divided into 9 areas, that fits with each the division made by the clusters. The analysis was based on the rationalised knowledge, coming from the literature review, and the interviews performed. Furthermore, the main benefits and risks, of each areas, have been identified.

"Identification of digital tool supporting the relationship"

In this phase, all the knowledge, coming from several University Courses and the Literature analysis ***(see Section 2)***, provides understanding about e-collaboration tools that could be useful in supporting collaboration among partners, in each situation.

"Case studies"

This allows to have a clearer picture of the major factors enabling of ecollaboration and the digital tools to support it. The aim of the research is to validate the results obtained through the comprehending of how company behave in the different situations. For this reason, The main tools utilized within this phase are related an empirical research activity "on the field" through interviews with manager of three Fashion Houses: Loro Piana, Dolce & Gabbana and Moncler.

APPENDIX_III

Questionnaire for the interviews:

- **Introduction of the company:**
  Annual turnover;
  Number of employees;
  Main production lines;
  Average amount of purchasing material;
- **Structure of the Upside Supply Chain - Suppliers:**
  Numerosity;
  Typology ;
  Importance (% of incidence on total purchases);
  Level of integration;
  Level of autonomy (the main decision are made by the Fashion House?)
- **Structure of the Upside Supply Chain - Customers:**
  Numerosity;
  Typology;
  Importance (% of incidence on total sales);
  Level of integration;
  Level of autonomy (the main decision are made by the Fashion House?)
- **Description of the digital document management system;**
- **Digitalization projects:**
  How do the exchanges with the suppliers take place: by mail, by web portal, EDI or others tool?
  If Edi is implemented, what is the percentage of the invoices that is managed by EDI over the total amount of the invoices?
  Are there collaboration projects with the main suppliers: joint planning, joint purchasing, joint development of new product, CPFR or VMI practices?
  How does the exchanges with the main customers take place? Which kind of technology is used to support the order cycle?
  Are there collaboration projects with the customers in particular ofr the joint management of marketing activities?
- **Internal level of digitalization :**
  Level of digital management of passive/active invoices? (indicative number of invoices dematerialized)
  Description of the digital document management system
- **Focus on the management of transport documents;**
- **Is there a web portal shared with the logistic service suppliers? Is the portal developed by the company or by the LSP ?**
- **What are the main benefits brought by the digitalization at the company and supply chain's levels?**
- **What are the main obstacles or the main drawbacks in the digitalization process?**
- **Are there any future e-collaborative projects?**

4. FRAMEWORK

4.1 Building the innovative solution

The analysis of literature performed in ***Section 2,*** provide room for inventions. *Alain Yee-Loong Chong (2009),* in "The relationship between supply chain factors and adoption of e-Collaboration tools: An empirical examination", suggests a simple framework to determine the supply chain factors influencing the adoption of e-Collaboration tools among Malaysian E&E organizations' supply chain. As many adoption model, using a developed framework for different environment creates the risk that additional significant factors are not considered, for example the abovementioned paper focuses only on supply chain factors. For this reason, it suggests that future studies should include other relevant factors. Specifically, factors such as national culture can be tested to see if these have an impact on information sharing among supply chain partners. It also highlight that it would be useful to conduct in-depth case studies examining the implementation of e-collaboration tools in the supply chains. In addition, *Chang (2012)* suggests for future research to examine the adoption of the different e-collaboration tools and to provide more insights in the e-collaboration decision model development.

The research framework has been built starting from the *Kraljic Portfolio Model,* that is useful to reflect over the main strategies used by the firms. The model has been modified shifting the focus of attention from the Purchasing Item to the Supplier Relationships. For this reason the research wants to investigate on the Strength of Relationship and Relationship Risk factors, that can enable or contrast the adoption and implementation of e-Collaboration tools. In detail, the Relationship Strength includes all the attributes related to the Strength of the Relationship among two partners and enabling the adoption of e-collaboration; while the Fashion Supply Chain Risk FH-L are all the Risk factor affecting the Fashion Supply Chain, concerned the specific relation Fashion House-Labor Suppliers.

**From this point on Fashion Supply Chain Risk FH-L will be called Relationship Risk.*

In particular, Strength of Relationship and Relationship Risk represent the independent variables, and are called Macro-variables, while the dependent variable is the best e-Collaboration tool for the specific relationship Fashion Houses-Labor Suppliers. For the first time, an holistic framework including them as components of a complete set of companies' attributes are designed. In addition, also the approach through which e-collaboration is studied changes: in all consideration there is a strong focus on the sector in analysis both for what concern the risk and the technologies more suitable to the processes. Given the results achieved in Phase 2, it is necessary to converge the two macro-variables in order to build an unique

framework. *In particular, the identification of the two macro variables are devoted towards the identification of the best digital tool, and that's represents an innovative approach to the study the E-collaboration in the Fashion Industry*. The final step of Phase_3.1 is dedicated to the definition of the shape of the qualitative theoretical framework. Having defined the methodology to design the innovative solution and to include e-collaboration tool choice in the model, the final structure of the model can be deployed and it is possible to finalize the theoretical framework. Both Macro variables, clearly define the overall characteristics of the Fashion Houses-Labor Suppliers relationship. Moreover, Relationship Strength variables provide the fashion experts with practical information on the possible competitive advantage such relationship can gain and it significantly influence the adoption of digital tools supporting collaboration. Risk attributes are relevant since they characterize the context in which the partners are acting; these variables are not directly manageable by the Fashion Houses but they change according to supply chain strategic decisions.

4.2 The problem setting: Phase_1 and Phase_2

In this part of Section 5 it has been applied the methodology described in Section 3 relatively to Phase_1 "Literature Classification" and Phase_2 "Choice attributes rationalization".

Strength of the relationship

The aim of this section is trying to identify on the basis of the literature what are the main important characteristics of the buyer-supplier relationship, that can determine the adoption of the e-collaboration tools. The literature has provided important attributes that could have been investigated and rather grouped in the main variables used in the model proposed. The importance of (Chong & Ooi, 2009) *'s* model is due to its simplicity and congruence in respect to E-collaboration field of study, ***See Section 2***. Its relevant contribution in e-collaboration research and actual knowledge is definitely aligned with the subject of investigation. In particular, the model will be the starting point of a further investigation of what other author wrote about each attribute.

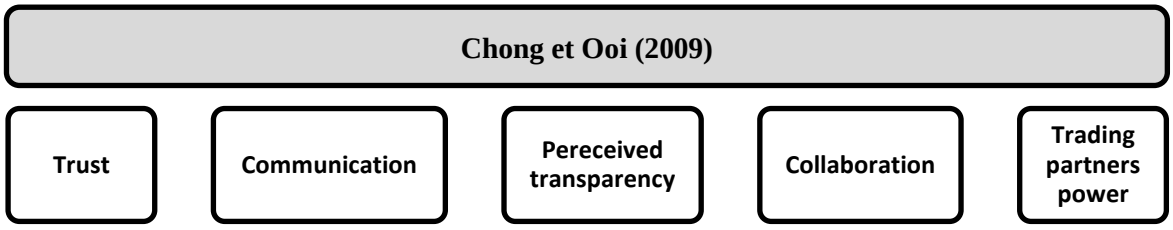


Figure 49 – Strength of the relationship attrivutes, source Chong et Ooi (2009).

Trust

The concept of trust has been dealt by different authors: it is seen as one of the main crucial elements that determine the relationship performance between two partners. (Sako, 1992) (Icasati-Johanson & Fleck, 2003) provides a distinctions between the different kind of trust:

- *Contractual trust:* the adherence of one party of the explicit and implicit points established inside a particular arrangement;
- *Competence trust*: the capability of one party to respect the output required and the performance level arranged;
- *Goodwill trust:* the cohesiveness that is created inside the relationship that brings one party to make extra tasks for the benefit of the two parties.

(Hughes & Weiss , 2007) stresses the importance of creating a culture of respect inside a relationship investing in the suppliers capabilities and reinforcing the scope of interaction in order to make the supplier successful. Different authors have proven the correlation between trust and the adoption of digital tool, as contained in (Chong & Ooi, 2009)**,** trust as integrity, competence, positive behaviour, loyalty and openness; increases the commitment in the adoption of Edi, or specific standard. According to (Chan, Chong, & Zhou , 2012), trust is one of the main important factor that enables the adoption of e-supply chain tools, indeed the e-collaboration creates the base for the exchange of important information about the supply chain or in addiction strategic data. Investments in IT are significant for companies that's why is necessary that the commitment of the suppliers in the relationship must be high. The information sharing enables the supplier to have more visibility over the customer allowing it to have short term benefit, but a trustable relationship make the immediate benefit uninteresting respect to the objective of advantage in the long term. The following table includes some definitions about the concept of trust, founded in the literature.

SOURCE	DESCRIPTION
Vangen & Huxham (2003)	It is important to gauge the level of trust and respect that may exist between the partners within the research environment
Reina and Reina (2006)	Trust is reciprocal, is that one has to give it in order to receive it, and built step by step over time
Batt and Purchase (2004)	Key area of concern in maintain a good relationship
Qureshi et al. (2005)	Key area of concern in maintain an effective communication
Barnes et al (2000)	Integrates success factor for collaboration
Reina and Reina (2006)	Trust increase through active engagement and participation with others nd the building of human relationship
Qureshi et al (2005)	Trust facilitate coordination and collaboration and assist with knowledge sharing
Vangen and Huxham (2003)	Trust, knowledge sharing and collaboration main elements of inter organizational relationships.
Mayer et al. (1995)	Trust as a propensity or attitude reflecting a willingness to take a risk and explained that trustworthiness was the antecedent to trust.

Figure 50 - Definition of trust

Communication and Perceived Transparency

The concept of communication is crucial for a good relationship between actors and the presence of a good collaborative culture is at the base for a future implementation of a collaborative tool. It is interesting to include in the concept of communication three crucial elements, identified by (Simatupang & Sridharan , 2002):

- *Information sharing:* it is the activity of collecting accurate, relevant and reliable information in order to proceed. The data must also be complete and updated in a way that must be useful for the scope of the decision making process;
- *Decision synchronisation:* it includes the joint decision making in a joint operational context. The information about the inventory level and the production planning is shared with the suppliers, in order to optimize the activities;
- *Incentive alignment:* the activity regarding the sharing of costs and benefits, such as savings that arise because of a good management of the stock level.

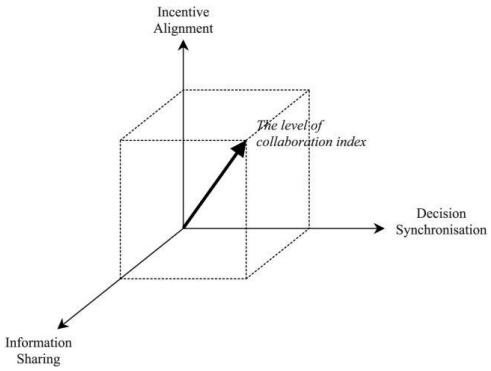


Figure 51 - Source Simatupang (2004).

(Simatupang & Sridharan , 2002) proposed a model that include "Information sharing" attribute together with the concept of communication, and "Decision synchronisation" and "Incentive alignment" attributes. (Chong & Ooi, 2009) considered the attribute "Perceived Transparency" but it has the same meaning of the ones that Simatupang calls information sharing. This model opens the possibility to consider Perceived transparency together with the concept of Communication, suggested by Simatupang.

SOURCE	**DESCRIPTION**
Icasati-Johanson et al (2003)	The ability to transmit accurate, relevant, and understandable information, openly and promptly is central for the success of supplier-customer relationships
Batt and Purchase (2004)	Communication as the key that holds together a channel of distribution

Figure 52 - Communication and Perceived Transparency

Collaboration - Vision

As previously described, (Chong & Ooi, 2009) defines Collaboration as the joint effort put by two or more partners, to reach the same goal. In literature, this concept is commonly called and defined "Vision". In particular (Shang, Chen, & Liu, 2005) clarifies the concept of vision as the capability, of two parties in the relationship, to create a common strategy to follow. When, in a relationship there is the same vision, there is the willingness to share information, to integrate themselves, to help each other in order to share the promised benefit. In addiction, the two parties will participate to the common projects with the same level of resources and commitments. The common vision has got as main consequence the creation of collaborative culture. To be as clear as possible, for now on the research will discuss about Vision considering also the above mentioned Collaboration concept.

Source	Description
Ganesan (1994)	The long term goal is to seek and maximize the lasting inter organizational relationship with business partners through a series of cooperation activities
Malone & Crowstone, (1994)	Collaborate, hence, means to obtain common goals and objectives in order to create competitive advantage and higher (individual and global) incomes for the members of the supply than the ones that could be obtained if each member works by its own

Figure 53 - - Communication and Perceived Transparency definition

Trading Partners' Power

Power is the ability of a firm to influence another firm to act in specific manner. This condition is usually realized when one of the two parties, in a relationship, has got the possibility to access to a variety of resources in order to maintain the control over the other party (Chong & Ooi, 2009). An interesting distinction over the concept of power is realized by (Hart & Saunders, 1997) that distinguishes between:

- *Convincing power*: incentive mechanism (by financial reward) used to encourage an organization to use a digital tool;
- *Compulsory power*: usage of a strong level of bargaining power to nearly force the partner to adopt imposed conditions.

Source	Description
Pfeffer & Salanzick (1978)	Inter organizational dependence is created when one business partner "does not entirely control all of the conditions necessary for the achievement of an action or for obtaining the outcome desired from the action
Ratnasingam (2000)	The capability of a firm to exert influence on another firm to act in a prescribed manner
Jun et al (2000)	A supplier that provides scarce resources or access to these resources has the power to exert significant control over inter-organizational transactions
Batt and Purchase (2004)	Power is an essential issue of organizations an instruments for coordination
Walker (2003)	Power in collaboration lies not in controlling the behavior of individuals, but rather in creating a situation that constrains or enables individuals

Figure 54 - Trading Partners' Power definition.

Finally, it is possible to reinterpret the (Chong & Ooi, 2009) model, considering what other author wrote about each attributes. The following framework represent the changing of the previous model, and reveals the new micro-variables regarding Strength of Relationship Macro-variable.

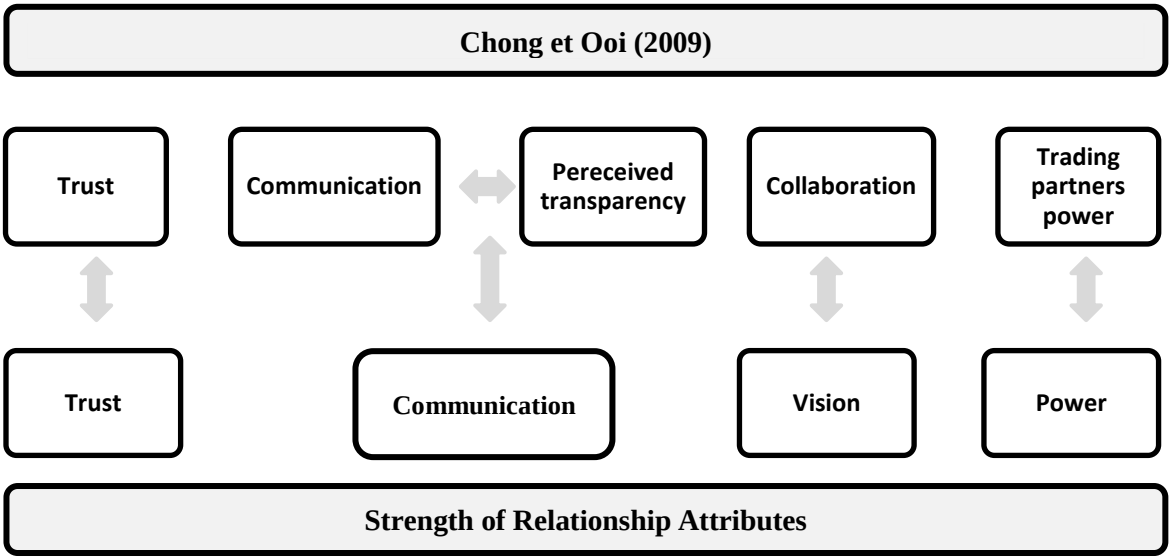


Figure 55 - - *Framework Strength of Relationship Attributes.*

The following table reports, for each attributes, the sources and definition taken into consideration.

ATTRIBUTE		SOURCE	Definition
TRUST		Chang et al. (2009)	Maintaining information over important supply chain information.
		Chang et al. (2009)	Transparency on information over the supply chain members.
		Chang et al. (2009)	Avoidance opportunistic behaviour even the presence of short term benefits.
		Sako (1992)	Adherence to contract terms.
		Sako (1992)	Express with one sty the skills and the competence.
		Sako (1992)	The expectation of additional tasks performed by the other party when required.
COMMUNICATION	Information Sharing	Simatupang et al (2005)	Sharing promotional events.
		Simatupang et al (2005)	Price changes.
		Simatupang et al (2005)	Points of sale data sharing.
		Simatupang et al (2005)	Sharing inventory policy.
		Simatupang et al (2005)	Sharing the order status and the order tracking.
	Decision synchronisation	Simatupang et al (2005)	Order status and order tracking.
		Simatupang et al (2005)	Joint development of demand forecast..
		Simatupang et al (2005)	Consultation on pricing policy.
		Simatupang et al (2005)	Joint decision on inventory requirement.
		Simatupang et al (2005)	Joint resolution on order exceptions.
		Simatupang et al (2005)	Joint decision of the optimal order quantity.
	Incentive alignment	Simatupang et al (2005)	Joint frequent shopper programmes.
		Simatupang et al (2005)	Allowance for product defects.
		Simatupang et al (2005)	Dalivery guarantee for a peak demand.
		Simatupang et al (2005)	Agreement on order changes.
VISION		Shang et al (2005)	Having a common strategic goal.
		Shang et al (2005)	Maintaining a long term strategy perspective.
		Shang et al (2005)	Share information and share resources for the purpose of a common goal.
POWER		Chang et al. (2009)	Capability of one partner to have influence over another.
		Chang et al. (2009)	Capability of one partner to make the other adopt particular practices.

Figure 56 - Attributes' Literature Definitions.

Relationship Risk in Fashion industry

After having analyzed all the processes, actors, and characteristics linked to the Fashion supply chain, ***see Section 3***, this paragraph wants to focus on the peculiarity of the Supply perspective of the model. The need to find information regarding the Fashion Supply Risk brought to the attention "Risk identification map for a Fashion Retail Supply Chain" made by (Martino , Fera, Sarno, Iannone, & Miranda, 2015). It has been the starting point to shape the second Macro-variable. All the issue related to Fashion industry Risk factors are well-described in the above mentioned work. It defines the objectives of the supply chain and risk factors related to each operational phase for a fashion company that manages an extended network of mixed-distributors. The paper refers to the Risk factors affecting all processes characterizing the Fashion Supply Chain. Considering that the aim of research is to find a framework related to the Fashion House-Labor Suppliers relationship, not all the Risk factors have to be considered.

For this reason, all the processes have been connected to the actors involved in the activities, and as consequence also the related attributes. (i.e. ***Section 3*** provides the definition and role of the each actor). In this case, two main tasks are connected to the relationship Fashion Houses-Labor Suppliers, that are: Creation of the Seasonal Collection and Materials procurement & dispatch to production plants.

For this reason, only the Supply Risks related to the actors in analysis are taken into consideration, as it is possible to see in the Table below.

ACTORS					
	RAW MATERIAL SUPPLIER	**TEXTILE MANUFACTURER**	**LABORATORIES ARTIGIANS**	**FASHION HOUSE**	**RETAILER**
Market trend Forecasting				In this phase In this step, several professional profiles are involved: **fashion designers, style consultants, cool-hunters, fashion bloggers and reporters.** Their main task is to analyze and forecast market trends for the following season according to main fabrics fairs, emerging street style and movie or pop star trend.	
Creation of Seasonal collection			It is a highly time-consuming activity and provides as output a wide variety of clothing items but not all of them will be then produced *Bandinelli, et al., 2013*. It is a process that can be hardly rationalized from **a management perspective by Fashion house, together with the main partners involved**, since the company needs to offer a wide variety to customers during the sales campaign.		
Assortment				The selection of the items is characterize by the mood of the seasonal collection and that will be surely recommended to the wholesalers and shown in the most representative stores. This selection is responsibility of the **Commercial Department and Styling Office.**	
Presentation & sales campaign				The collection is presented in the most important sector and after that, the sales campaign can start. In this period, **the company can record orders from wholesalers**. All the clients undergo a financial assessment and then their orders can be approved after the solvency check. Most of these orders may be affected by some changes even after conclusion of this campaign	
Production orders launch				This phase is almost **contemporary to the previous one.** Orders already forwarded to production for which there is an insolvency problem, are hold as "suspended orders". They will be not delivered to the client but will be made available for other clients' orders even during the selling season.	
Materials procurement & dispatch to production plants		It is supposed that supply of fabrics and accessories is directly borne by the main company. It may happen that this process is performed by suppliers according to customer's specifications. In this phase, often material do not pass through the central warehouse but are directly delivered from **fabric's suppliers to producers.**			
Finished products receiving				When receiving finished products in the **Producer**'s central warehouse or logistic center, two main checks are performed: (i) quantity check; (ii) quality check.	
Deliveries to customers and stores				The personalized kits of items to send to **stores and clients** are prepared by warehouse staff or, in some cases, by **producers** themselves. From one side, it results in a leaner material handling process, but on the other, it leads to not optimized transports, since some packages are half-empty.	
Sales to final customers				It is the actual selling season. During this period no other production orders are launched. In order to meet actual demand, **company can ship to stores** on-hand inventories, such as those items stuck in the warehouse due to the "suspended orders".	
Returns of unsold stock from stores and clients				At the end of the selling season, the **central warehouse receives unsold stocks** both from stores and wholesalers according to specific commercial agreements. This step is similar to the "Finished products receiving" one since both quality and quantity check must be performed and the same overloading problems may arise.	
Outlet assortment				**Returned items** must be refurbished and priced with **outlet discounts**. In some cases, in order to offer a wider assortment and attract customers, the company launches a specific production of items destined to outlet stores, using left-over fabrics.	
Deliveries to outlet				This step is similar to the "**Deliveries to customers and stores**" one even if quantities to handle are significantly lower.	

Figure 57 - – Intersections Fashion Actor – Processes.

In parallel to the selection of the right Risk Factors, new grouping attributes, related to the specific relationship Labor Suppliers-Fashion Houses, have been identified. During this phase a deep understanding of the literature and the interview performed were the input of all the reasoning behind the attribute selection.

Collection peculiarity	The Supply –side risk is subject to the typology of Collection peculiarity. In particular, the typology of collection peculiarity, related to the number of variant, the changing-frequency, the diversification or customisation based on different country-destination.
Knowledge	Supplier knowledge is a critical issue. A weak knowledge, due to inefficiency of all the processes or bad communication, could lead to bad performances - high defects rate, delays and wastes.
Technology	Technologies is more and more a strategies factor for partnerships and collaborations between partners due the increasing product complexity. The necessity of IT processes supporting production and operation is fundamental to cover the risks the partner-company can incur.
Complexity of work	Fashion products could be more or less complex. This peculiarity depends on the typology of product. The quality standards, and the final customer (example children clothes need a particular attention to the safety). As expected there is a strong impact on all the processes involved.
Supply Network	In this variable, all the factors, that determine the supply network are included: number of suppliers, distance between the focal company and them, number of tiers, difference in culture and vision. The aim is to assess the geographical dispersion and temporal separation.

Figure 58 - Definition of the micro-variables related to Relationship Risk.

Summarizing, we have identified five grouping variables and the risks connected to the actors in analysis, and so also all the risk factors related to the "Creation of the Seasonal Collection" and "Materials procurement & dispatch to production plants" processes. The next step was to group the different Risk factors into the grouping variables. ***Figure 55*** is explicative about the outcome.

RISK FACTORS		DESCRIPTION
COLLECTION PECULIARITY	Many new product launches failed	The risks related to the supply-side are subject to the of Collection peculiarities. In particular the collection peculiarity is affecting the number of variant, the changing-frequency, the diversification or customisation, basing on different country-destination.
	Poor offer differentiation	
	Excessive focus on continuative items	
	Customization in international markets	
	Design of only two collections a year	
	Inefficient interaction styling office/marketing office	
	No optimization due to strong differentiation of orders	
KNOWLEDGE	Deviation between offered and expected product quality	Supplier knowledge is a critical issue. A weak knowledge, due to inefficiency of all the processes or bad communication, could lead to bad performances - high defects rate, delays and wastes.
	Process misalignment between actors	
	Long production lead time	
	No accurate quality control in Labor Suppliers/suppliers by supplier themselves	
	Excessive production waste	
TECHNOLOGY	Inefficient interaction styling office/suppliers	Technologies is more and more a strategic factor, enabling partnerships and collaborations between partners, due to the increasing product complexity. The necessity of IT processes, supporting production and operation, is fundamental to cover the risks the partner-company can incur.
	Process misalignment between actors	
	No control on production progress status	
	No IT support to production	
COMPLEXITY OF WORK	Long production lead time	Fashion products could be more or less complex. This peculiarity depends on the typology of product, the quality standards, and the final customer (example children's product). As expected, there is a strong impact on all the processes involved.
	Excessive defective percentage	
	Excessive production waste	
	sharing inventory policy	
	sharing the order status and the order tracking	
SUPPLY NETWORK	Production and delivery of the whole purchase lot before the selling season	It includes:number of suppliers, distance, number of tiers, difference in culture and vision. "Geographical dispersion": members are geo-graphically spread across multiple countries. "Temporal separation": members could have different working schedule, due to differences in the location or in the working hours.
	Production of more items by a single supplier	
	Delivery delays raw materials	
	Limited flexibility	
	Long distances between raw materials and finished products producers	
	No assessment/control on suppliers environmental policies	

Figure 59- Risk factors related to the Relationship Fashion Houses – Labor Suppliers.

	TARGET	*Creation of Seasonal collection*	*procurement & dispatch to production*	GROUPING DRIVERS
BRAND ATTRACTIVENESS	Many new product launches failed	**x**		COLLECTION PECULIARITY
	Poor offer differentiation	**x**		COLLECTION PECULIARITY
	Excessive focus on continuative items	**x**		COLLECTION PECULIARITY
	Customization in international markets	x		COLLECTION PECULIARITY
	Design of only two collections a year	x		COLLECTION PECULIARITY
	Deviation between offered and expected product quality		x	COLLECTION PECULIARITY
TIME BASED COMPETITION	Inefficient interaction styling office/marketing office	x		COLLECTION PECULIARITY
	Inefficient interaction styling office/suppliers	x		TECHNOLOGY
	Process misalignment between actors		**x**	TECHNOLOGY; KNOWLEDGE
	Production and delivery of the whole purchase lot before the selling season		**x**	SUPPLY NETWORK
	Production of more items by a single supplier			SUPPLY NETWORK
	Poor "virtual integration"		**x**	INTERNAL CHOICE
	Orders launch close to the selling season		**x**	INTERNAL CHOICE
	Long production lead time		**x**	COMPLEXITY OF WORK , KNOWLEDGE
	Delivery delays raw materials		**x**	SUPPLY NETWORK
MATERIAL FLOW MANAGEMENT	No accurate quality control in Labor Suppliers/suppliers by supplier themselves		**x**	KNOWLEDGE
	Limited flexibility		**x**	SUPPLY NETWORK
	Limited production capacity		**x**	INTERNAL CHOICE
	Excessive defective percentage		**x**	COMPLEXITY OF WORK ; KNOWLEDGE
	No optimization due to strong differentiation of orders		**x**	COLLECTION PECULIARITY
	No control on production progress status		**x**	TECHNOLOGY
BRAND INT. AND MARKET EXP	Poor diversification from competitor's products	**x**		INTERNAL CHOICE
ENVIRONMENTAL SUSTAINABILITY	No use of organic fabrics, recyclable materials or local resources (eco-design):	**x**		INTERNAL CHOICE
	Limited use of excess fabrics		**x**	INTERNAL CHOICE
	No IT support to production		**x**	TECHNOLOGY
	Long distances between raw materials and finished products producers		**x**	SUPPLY NETWORK
	No assessment/control on suppliers environmental policies		**x**	SUPPLY NETWORK
	Excessive production waste		**x**	COMPLEXITY OF WORK ; KNOWLEDGE

Figure 60 - Grouping Drivers for each Risk Factor in analysis

The following graph provides an broad overview of the final representation of Problem Setting Phase:

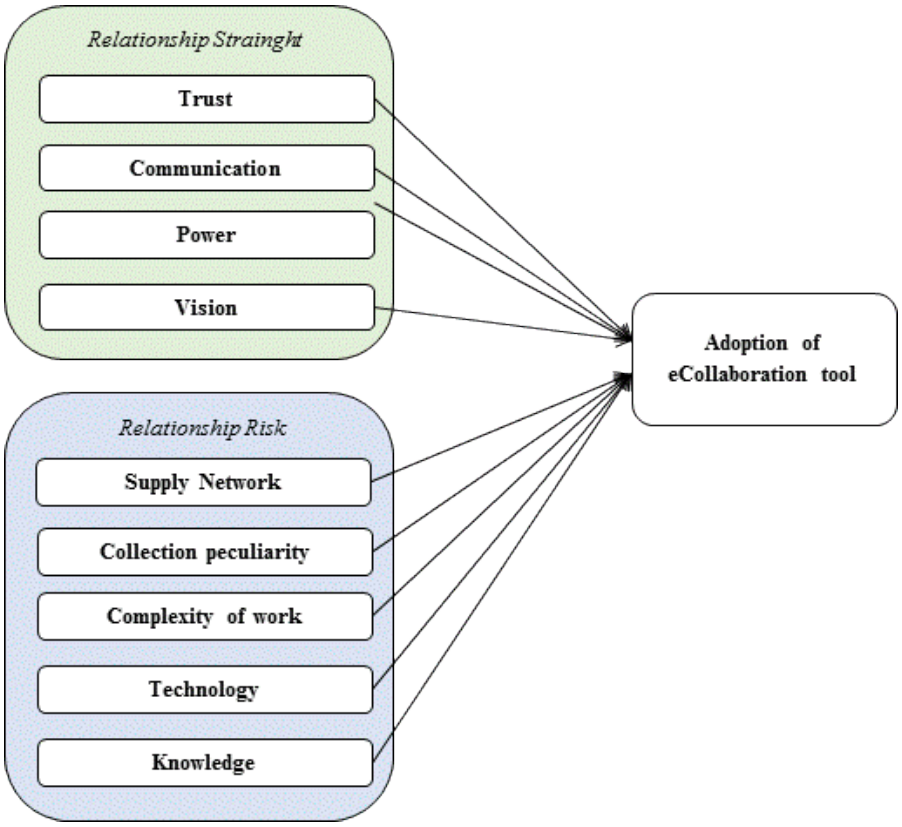


Figure 61 – Final representation of Problem Setting Phase.

4.3. Theoretical framework design: the qualitative solution (Phase_3.1)

As described in the previous paragraph, in literature there is a strong correlation between Relationship risk, Relationship Strength and the choice of adoption of E collaboration or more common digital tool to support the interaction and communication among partners. Once defined the macro-variables, Relationship strength and Relationship risk, which impact on the adoption of e-collaboration tool, suggested by literature, Phase_3.1 is aimed at introducing e-collaboration attractiveness to the respect of these macro-variables, formalizing the final theoretical framework from a qualitative perspective. "The relationship between supply chain factors and adoption of e-Collaboration tools: An empirical examination" written by Alain Yee-

Loong, Chong, Keng-Boon Ooi, Amrik Sohal and "Drivers of close supply chain collaboration: one size fits all?" made by Sander de Leeuw, Jan Fransoo are two important paper that are fundamental to go head in this phase.

Strength of relationship

Trust

"Trust" is one of the most important determinants in the choice of the labor suppliers for a Fashion Houses. In the fashion world there is a strong need of an high level of privacy and information security. The same need characterize also the manufacturing companies that treats produce "special" products, like children clothes. Trust plays an important role in the adoption of e-Collaboration tools, because they involves transparency and sharing of information among the supply chain members. The role played by trust in collaboration has been strongly analyzed: the higher the trust, the higher is the willingness to adopt e-Collaboration tools. In the case of e-Collaboration adoption, the trust is the firms' willingness to trust their supply chain partners in sharing important supply chain information, i.e. product designs. (Chong & Ooi, 2009) An organization that trusts its partners is more likely to reach consensus in terms of achievable benefits by e-Collaboration tools (Shang, Chen, & Liu, 2005)

There is a positive and significant relationship between trust and the adoption level of e-Collaboration tools. (Chong & Ooi, 2009)

Communication

In the B2B environment, individuals from different organizational functions, or companies have different points of view. For this reason there is the need of increase and enforce communication. It will bring to an enhancement of e-collaboration tool adoption, that enable a more fast and flexible interaction among partners.

There is a positive and significant relationship between communication and the adoption level of e-Collaboration tools. (Chong 2009)

Power

In the past, many experts argue that power of a supplier prevent supply chain collaboration and a more equal distribution of power implies a more collaborative firm (Jassawalla & Sashittal, 1998). However more recently, (Caniels & Gelderman , 2007) concluded that even in situations that are considered as a strategic partnership, there may be an imbalance in power. In fact, power can be used to promote integration of a supply chain. In situations where there is a clear dominant partner one party takes the lead to develop collaborative initiatives (de Leeuw & Fransoo, 2009). It is evident that the most effective supply chains have a dominating organization that sees benefits of supply chain collaboration and e-collaboration and forces the rest to comply. All the interviewees argued that a situation of interdependence is needed to setup collaborative initiatives, in particular e-collaboration initiative. There is a clear and practical example in the fashion industry: the big retailers, like Rinascente, Wallmart, take the initiatives towards supply chain e-collaboration and many suppliers are obliged to follow their standards to work with them, i.e. implementation of EDI solutions.

There is a positive and significant relationship between Power and the adoption level of e-Collaboration tools, (Chong & Ooi, 2009).

Vision

The more two partners have common mission and goals; the more the need of strategic tool to support the continuous interaction among partners. With Internet, organizations are able to integrate their inter and intra organizational business processes within functional departments and supply chain members via e-collaboration tools (Chong & Ooi, 2009).

There is a positive and significant relationship between Vision and the adoption level of e-Collaboration tools. (Chong & Ooi, 2009).

Supply Risk in Fashion industry

Supply network

Supply chains, like the fashion one, are vulnerable to perturbations resulting from a strong dependence on other network's players, such as suppliers or logistics providers. The need of

communication and cooperation is always increasing. The aim is to assess and manage risks connected to the different stages of the value chain, as well as external and not directly controllable risks. In other words the aim is to be able to ensure continuity in supply.

There is a positive and significant relationship between Supply network and the adoption level of E-collaboration tools, (Chong 2009).

Collection peculiarity

Considering this grouping variable, the risk is determined by the frequency of transaction, the number of collection a years, and all the factor that affect the complexity of products produced by supplier, from operational perspective. According to *Chang (2003),* firms in a high transaction frequency supply chain environment not only compete on price but rather on the ability to solve process and product problems, with supply chain partners and customers. The volume and frequency of transactions are supply chain characteristics that can differentiate between adopters and non-adopters of e-Collaboration tools, they have a strong impact on the supply chain collaboration readiness among organizations.

There is a positive and significant relationship between product volume and transaction frequency and the adoption level of e-Collaboration tools, (Chong 2009).

Complexity of work

Products that are complicated to build will often need to be customized to meet the needs of specific customers. All the fashion Houses, producing these products, will have to work closely with its suppliers and customers, in areas product design, production, business strategy, and distribution. Organizations with higher product complexity will ‘‘develop organizational and information technology links with their closest suppliers, bringing them closer to manufacturing processes, allowing them to influence product strategies more than they could by conventional technologies such as EDI”. If the products can be described with minimum specification, there is less need to invest in information systems that integrate with suppliers. (Chatterjee & Ravinchandran, 2004) (Garcia-Dastague & Lambert , 2005) (Michelino, Bianco, & Caputo, 2008) also support the idea that a complex product will influence the adoption of e-Collaboration tools.

There is a positive and significant relationship between product complexity and the adoption level of e-Collaboration tools.

Technology and Knowledge

The more suppliers have recognized skills and capabilities, possess proprietary technology and are very active in research, the more strategic partnerships are desired *(* (Corswant & Fredriksson, 2002) (Goffin, Lemke, & Szwejczewski, 2006). Capabilities are intended as, for example, familiarity of a firm with technology, knowledge and competencies or technological and design capabilities (Oh & Rhee , 2008) and for what concern new product development projects, (Petersen, Handfield, R.B , & Ragatz, 2005) found that supplier process and product knowledge are the most relevant, in building close relationship. The positive trend, to communicate NDP and design output though technologies, let to say that:

there is a positive and significant relationship between Knowledge and Technology understanding and the adoption level of e-Collaboration tools.

Summarizing there is positive relationships between the grouping variables and the macro variables, and, in addiction, positive relationships between the macro variable and the Adoption of E-collaboration. For this reason, there is a positive correlation between all the grouping variable and the final goal of the model.

4.4 The shape of theoretical framework

The final output is the combination of Relationship Strength, Relationship Risk and their implication in the adoption of E-collaboration. The following scheme describes the final design of the qualitative innovative theoretical framework:

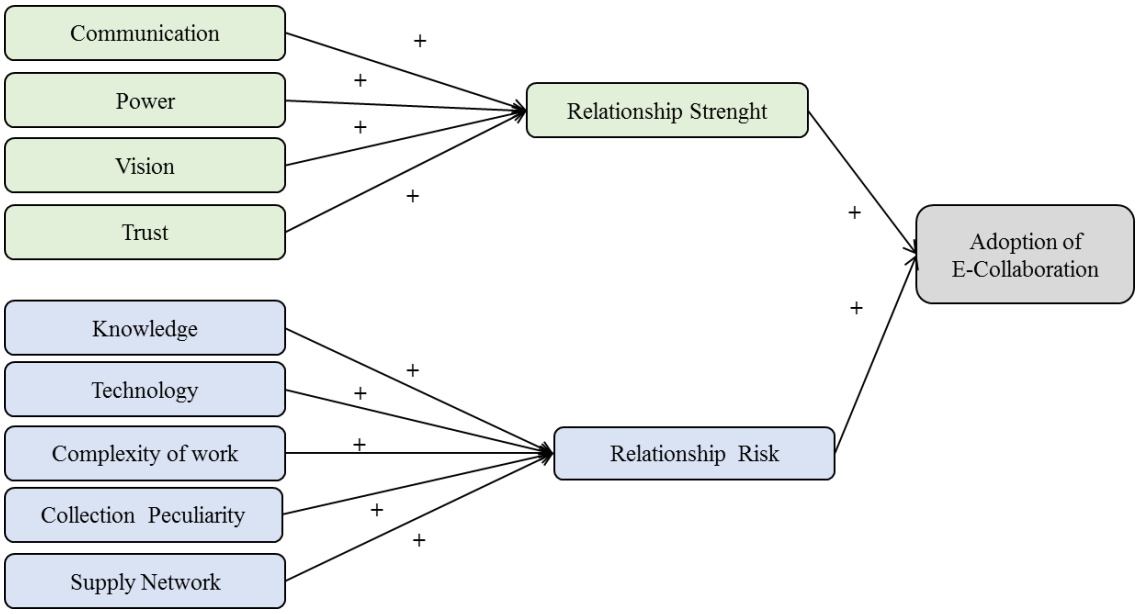


Figure 62 - Problem Solving Output.

The contribution of Fashion Houses' experts, supported the appropriateness of the assumptions through which micro-variables, have been classified and the Relationship Risk and Relationship Strength macro-variable have been designed.

4.5 Theoretical framework design: the quantitative model (Phase_3.2)

Each qualitative framework can be considered appropriate and effective only whether it can be empirically implemented in an effective way (Nilsen, 2015). The following paragraph describes how the qualitative theoretical framework has been transformed into a quantitative tool for empirical analysis. In this part of the project, the aim is trying to define a dashboard of KPI in order to classify the companies that has been interviewed. Once introduced the two main groups of variables of the framework: relationship variables and Risk variables, for each variable is important to define a scale of measure, univocally defined. The variables are measured on a

scale from 1 to 3 points; the score is related to particular features of the company. In order to defined the scale of measure, a literature analysis has been conducted. Each company is positioned in the framework according to two important results, one from the relationship axis and one from the risk axis. The Strength of Relationship and the Supply Risk levels are calculated by a weighted mean of the different KPI associated to the variables.

Strength of the Relationship

As concerned the relationship's variables, the scale of measure is based on the literature analysis. (Kock, 2010) identified three main level of Relationship Strength in the buyer-supplier relationship. The first level of interaction is called cooperation: there is a low level of strength in the relationship, the transaction with the supplier is informal, the supplier is not considered strategic and there are not program for sharing risk and advantages between the two business partner. The second level is called coordination: it is realized when the two business partners are able to create a more formal environment of work for the exchanges and for the creation of the communication channel. Finally, the last level is the collaboration: it represents the best level of integration and happens when the two business partner are able to overcome the individual barriers of the organization, working jointly for the realization of a superior objective. The Relationship Strenght is based on a scale from 1 to 3 points, where 1 corresponds to the cooperation level, 2 corresponds to the coordination level and 3 is used to described the highest level of integration, called collaboration.

The scale for "Trust" is based on the model proposed by (Sako, 1992) . He defined three level of trust to describe the level of strength between buyers and suppliers.

- *Contractual trust*: when the other party will adhere to the point of the contracts;
- *Competence trust:* when the other party will execute the tasks indicated in the contract with the performance required;
- *Goodwill trust:* when the party in the contract executes additional activity, even if they are not explicitly indicated in the contract, for sake of the relationship with the partner and when it is clear that both the members work for a shared goal.

The scale for the other variables such as: power, vision and communication are extracted from the model of (Kock, 2010). Also in this case, the metrics are defined from 1 to 3 points. As concerned with the power, the more the two business partner collaborate overcoming "the silos" of the organization, the more they share benefit the more the relationship is solid. This is a clear

index of the good attitude of the two companies towards collaboration. As for the vision, a good measure towards the strength of the relationship is the commitment of the organization towards integration: if the individual are committed to the culture of share information, objectives not only in the short term but also in the long term, the vision index maintains a high level. Finally, the last variable is the communication variable: if the index is high, the attitudes of two organization to coordinate the activities, establishing joint production planning creating a joined strategy to pursue. In the communication index, it is explicated if the two actors exchanges correct and update data for the good of the relationship.

ATTRIBUTES	SCORE 1 COOPERATION	2 COORDINATION	3 COLLABORATION
TRUST	Contractual	Competence	Goodwill trust
POWER	Authority rests solely with the individual organisation; leadership is unilateral and control is central; All authority and accountability rests with the individual organisation which acts independently	Authority rests with the individual organisation but there is consultation among participants; some sharing leadership and control; some shared risk, but most of the authority and accountability falls to the individual organisation	Authority is determined by the collaboration to balance ownership by the individual organisation with expediency to accomplish purpose; leadership is dispersed and control is shared and mutual; Equal risk is shared by all organisations in the collaboration
VISION	Basis for cooperation is usually between individuals but may e mandated by a third party; organisational mission and goals are not taken into account; interaction on a needed basis.	Individual relationship are supported by the organisations they represent; mission and goals of the individual organizations are reviewed for compatibility; interaction is usually around one specific project or task of definable length.	Commitment of the organisation and their leaders are fully behind their representative; common mission and goals created; one more projects are undertaken for long term results.
COMMUNI-CATION	Relationships are informal and each organisation functions separately; No joint planning is required; information is conveyed as needed.	Organisations take on roles, but function relatively independently from each other; some project-specific planning is required; communication roles are established and definite channels are created for interaction.	Creation of new organisation structure and/ or defined and interrelated roles costituing formal division of Labor; comprehensive planning is required that includes developing joint strategies and measuring success in terms of impact on needs of those served.

Figure 63 - Quantitative Attributes Scale - Relationship Strength.

Supply Risk in FSC

Also in this case, the scale is evaluated on a metric from 1 to 3 points. The main starting points of the analysis are extracted from the existing literature and in particular from (Chan, Chong, & Zhou , 2012).

- *Complexity of production:* the scale of measure is build if the product can't be divided in different modules. As a consequence, the complexity is linked to the impossibility to standardize the different phases of the production and to create different procedures;
- *Supply network:* the level of risk raises as the number of supplier increase and also if the distribution increase the geographical scale;
- *Technology culture:* the level of risk is higher if there is the necessity to monitor the production and operation with an intensive use of IT. For example, an increase of visibility over the processes is required when the product complexity is high;
- *Knowledge:* this grouping variable considers that if the level of expertise of the supplier is high and focused specifically in the fashion sector, the level of risk in the relationship declines. In addiction the variable consider an increase of the risk if the supplier hasn't got certifications about quality of the processes and sustainability issues;
- *Collection peculiarity:* the more products are customized and characterized by short time-to-market, the more the complexity and the risk inside the supply chain increase..

ATTRIBUTES	SCORE		
	1	2	3
COMPLEXITY OF PRODUCTION	Possibility to distinguish different modules, possibility to standardize the product	Possibility to distinguish different macro-phases of work to realise the product	Possibility to distinguish the different raw materials
SUPPLY NETWORK	The number of supplier is quite low, (<10) distributed mainly in one main region.	The number of supplier is between (10<x<50) distributed at a national level.	The number of suppliers is high (x>50) and they are distributed at international level
TECHNOLOGY	Production and processes do not require specific it skills, do the low level of product complexity,	Normal use of digital tool to execute of operational activities, good management of the information.	Completely necessity of digital tool for the normal operational activity. Necessity of visibility and control over the processes.
KNOWLEDGE	The suppliers are used to perform activities, over more businesses. Fashion processes and activities are not its core business, and so it has not the best expertise and knowledge.	The supplier is used to execute important activities, the main business is in the fashion sector. They have got certification of quality and sustainability	The suppliers are totally focused of Fashion Sector, they have long period expertise and they used to perform core activities for the Fashion Houses.
COLLECTION PECULIARITY	The products are quite standard, not great variation.	High number of different variant of the article, quite low level of customization.	High number of variant per product, high level of customization. Short time to market necessity of high level of coordination. High level of variation

Figure 64 - Quantitative Attributes Scale - Relationship Risk.

5. EMPIRICAL IMPLEMENTATION

5.1 Introduction to the empirical implementation

Definition of the contest of analysis

The third objective of the research is the development of a model able to position Fashion Companies in a matrix able to define the best Digital tool to support the relationship between Fashion Houses and Labor Suppliers. To pursue the final scope, the framework takes into consideration two macro variables: Relationship Strength and Relationship Risk. The first one wants to analyzed how much the company is connected to the Labor Suppliers in terms of Trust, Power, Vision and Communication. The second one instead focuses the attention to the main causes of uncertainty and risk in the relationship of focus.

This is the structure of the framework and will be the starting point to answer to third research questions:

- *Research Question N.3 - Which technologies the Innovative Framework suggest to support Fashion Houses-Labor Suppliers relationships?*

Sample characteristics

The interviews performed are 21, but not all the ones are taken positioned in the model. The sample in analysis includes 17 companies, belonging to the Fashion Supply Chain: Canali, Fashion box, Gianni Versace, Golden Point, Gucci, Hugo boss, Il Gufo, La Perla, Lotto, Manifattura Mario Colombo, Mantero, Miroglio, OTB, Parah, Patrizia Pepe, Pompea, Twinset.

They are Italian Fashion Houses of both high and low level positioning in term of price and quality. They are traditional companies not the Fast Fashion followers and they have a turnover higher than 10 million. The distribution is world-wide and in same also the supply-base.

5.2 Dataset building and Findings

As far as is concerned this section, the main important objective is trying to build the framework to describe the e-collaboration phenomena in the Fashion supply chain. Each company is evaluated according the metrics defined and plotted on the graph.

Y= Strength of Relationship	*Weight*	Canali	Fashion Box Spa	Gianni Versace	Golden Lady	Gucci Logistic	Hugo Boss	Il Gufo	La Perla	Lotto Sport	Mario Manifattura Colombo	Mantero Seta	Miroglio Fashion	Otb	Parah	Patrizia Pepe	Pompea	Twinset
Trust	*0,25*	2	1	3	1	3	2	2	2	3	2	1	1	3	1	1	1	2
Power	*0,25*	3	2	3	1	3	2	3	2	2	2	3	2	3	2	3	2	3
Vision	*0,25*	3	2	2	1	3	3	1	2	3	2	2	2	3	1	2	1	2
Communication	*0,25*	3	2	3	1	3	3	1	2	3	2	3	2	3	1	2	1	2
TOT	***1,0***	**2,7**	**1,7**	**2,7**	**1**	**3**	**2,5**	**1,75**	**2**	**2,7**	**2**	**2,2**	**1,7**	**3**	**1,2**	**2**	**1,2**	**2,2**

X = Supply risk	*Weight*	Canali	Fashion Box Spa	Gianni Versace	Golden Lady	Gucci Logistic	Hugo Boss	Il Gufo	La Perla	Lotto Sport	Manifattura Mario Colombo	Mantero Seta	Miroglio Fashion	Otb	Parah	Patrizia Pepe	Pompea	Twinset
Collection peculiarity	**0,20**	2	3	2	1	3	2	3	3	3	3	1	2	2	1	2	1	3
Technology	**0,20**	1	1	2	1	3	3	2	2	3	2	2	2	3	1	1	1	2
Supply Network	**0,20**	1	2	1	1	1	3	2	2	3	3	3	3	3	1	2	2	2
Complexity Of Production	**0,20**	2	2	2	1	3	2	3	2	3	3	3	2	3	1	2	1	1
Knowledge	**0,20**	1	1	2	1	3	2	2	1	3	3	3	2	3	1	2	1	1
TOT	**1,0**	**1,4**	**1,8**	**1,8**	**1**	**2,6**	**2,4**	**2,4**	**2**	**3**	**2,8**	**2,4**	**2,2**	**2,8**	**1**	**1,8**	**1,2**	**1,8**

Figure 65 – Empirical implementation Dataset.

In the following table, the explanation of the score for each company according to the different macro variables is summarized.

	STRENGTH OF RELATIONSHIP	RISK OF SUPPLY
CANALI	HIGH. It uses suppliers with which it establishes a trusted relationship. It a very high decision-making power (both for the models to be developed and for the supply of raw materials). It tries to maintain a good and continuous communication so that you keep up the same goals.	LOW. The products do not have great machining complexity, as suppliers are given very small work orders. They also do not require exclusive know-how and niche. The presence of few suppliers helps in managing operations but does not allow diversifying the supply risk.
FASHION BOX	MEDIUM. It does not require vendor exclusivity, nor does it need special privacy. Communication is necessary as Fashion Box wants to retain great decision-making power when it comes to raw materials and models.	MEDIUM. Although the workings are fairly simple, the risk is associated with the fact that only large-scale commissioning works. The number of suppliers is low so it is not possible to diversify the risk.
GIANNI VERSACE	HIGH. Gianni Versace requires first of all the confidence of our suppliers, who must maintain a high level of privacy. High decision-making power, and need to have common goals and great communication	MEDIUM. Average risks, with regard to both the complexity of the product and the need for ever-changing workmanship, each collection. Low complexity in managing the supplier network.
GOLDEN POINT	LOW. Very simple and standard machining, there is no need for fiduciary relationships or common visions. The basic aspect is to achieve a competitive final price	LOW. Small machining, large number of suppliers with the company, technologies and know-how required are irrelevant, so the risk of very low delivery.
GUCCI	HIGH. Relationships with suppliers are exclusive, with whom Gucci interacts with real time information and identifies common goal. The suppliers are in Tuscany, it makes order placements,almost saturate their production capacity. Great need for privacy and trust at the base of the relationship. Gucci decides everything, from raw materials, production placements, style.	HIGH. The risk is high for all items, except for Supply Network. All suppliers are located in Tuscany, they have with Gucci has "historical" relationships and are all active in Gucci production almost entirely.
HUGO BOSS	HIGH. Very simple and standard machining,	MEDIUM. Medium risk, the complexity of

	there is no need for fiduciary relationships or common visions. The basic aspect is to achieve a competitive final price	the machining is medium. Suppliers could be local.
IL GUFO	MEDIUM. High decision-making power of the parent company both on raw materials and on the phases of processing. Necessity of trust, because Il Gufo control and check the quality of product at the end of each phase. Suppliers can't the advancement of production.	HIGH. There are many suppliers who perform very small machining on the same product line, but they have no interaction each other. However, the complexity of the product is very high and also the required know-how important, as they produce children's products whose defect must be minimal.
LA PERLA	MEDIUM. Decision-making power and high confidence need. La Perla decides the raw materials to use, but does not require alignment of the targets.	MEDIUM. Product can be complex but also simple to manufacture, and the know-how required is not difficult to acquire. La Perla tends to outsource major parts to a single supplier.
LOTTO	HIGH. The relationship requires trust, privacy, and security of information, common goal, and continuous interactions. Lot does not decide on raw materials (it can advise who to supply), but provides the templates (3D printing development).	HIGH. Large commissions to very few suppliers. The Principal supplier is located in Asia. Long-distance relationship increases the risk both for the limited control and the difficulty of communication.
MANIFATTURA MARIO COLOMBO	MEDIUM. Importance of supplier trust to ensure high-quality products and durability, and certification of the origin and quality of raw materials. There are no exclusive relationships, each supplier may have relationships with other mothers.	HIGH. Workings are carried out by a limited number of partners. The complexity of the product is medium high, it is not high fashion products, but it has to guarantee quality and safety standards.
MANTERO	MEDIUM. Very great decision-making power with respect to the raw materials used in processing, as well as the need for trust. Mantero does not require relationship exclusivity, but needs to frequently monitor the suppliers.	HIGH. The biggest problem is given by the supplier's distance, the complexity of the machining process, and because it is necessary to have specific machineries for the other defect rate that one can find. However, Mantero manages relationships with few and trusted suppliers who carry small parts.
MIROGLIO	MEDIUM. It does not require absolute exclusivity from suppliers. Decision-making	HIGH. Miroglio assigns to the suppliers a large part of the collection, the bulk of

	power is limited, sometimes it sends templates, but is the supplier who chooses the appropriate raw materials.	finished garments, preferring to handle relationships with few suppliers. The garments are not of high fashion, so the complexity of the product and the know-how.
OTB	HIGH. It requires extreme confidence and decision-making power, decides on raw materials, templates and requires almost exclusive exclusivity with some of the most important suppliers. Needs informational interaction and common visions	HIGH. The supply risk is average. The product is of high quality therefore has a high intrinsic complexity, also the know-how required is specific to each product and fabric processing.
PARAH	LOW. There is no need of relationship exclusivity, continuous interaction, common support with vendors and Information protection. Average decision-making power, it chooses suppliers according to specifications and quality standards.	LOW. Few suppliers have a somewhat higher supply risk, but seem to be in a range less than the other ones. Product complexity and low supply size. No particular knowledge or technology is required.
PATRIZIA PEPE	MEDIUM. High enough decision-making power, you can choose raw materials, on certain heads. However, Patrizia Pepe does not require either exclusivity or high privacy protection.	MEDIUJM. The supply risk is well balanced in all respects.
POMPEA	LOW. Pompea has no privacy issues and does not require exclusivity and continuous interactions. It has so many suppliers that it often turns. However, it can decide on some raw materials.	LOW. Low supply risk. Supplier Network is spread over multiple suppliers, located near the parent company. Suppliers accept small and standard commissions
TWINSET	MEDIUM. Twinset has a strong decision-making power with regard to raw materials and sometimes provides commissioning entire bosses by communicating information about the models. For this reason, it is necessary to establish trust and protection for some part of production.	MEDIUM. The batch size of the supply is high in size and requires specific technologies. However, the reduced distance between suppliers and the low complexity of the product can alleviate the difficulties.

Figure 66 – Respondents Macrovariable Definition

Starting from the value in input, listed in the Dataset, the observations of the sample in analysis are positioned according to the two axes in the following graph.

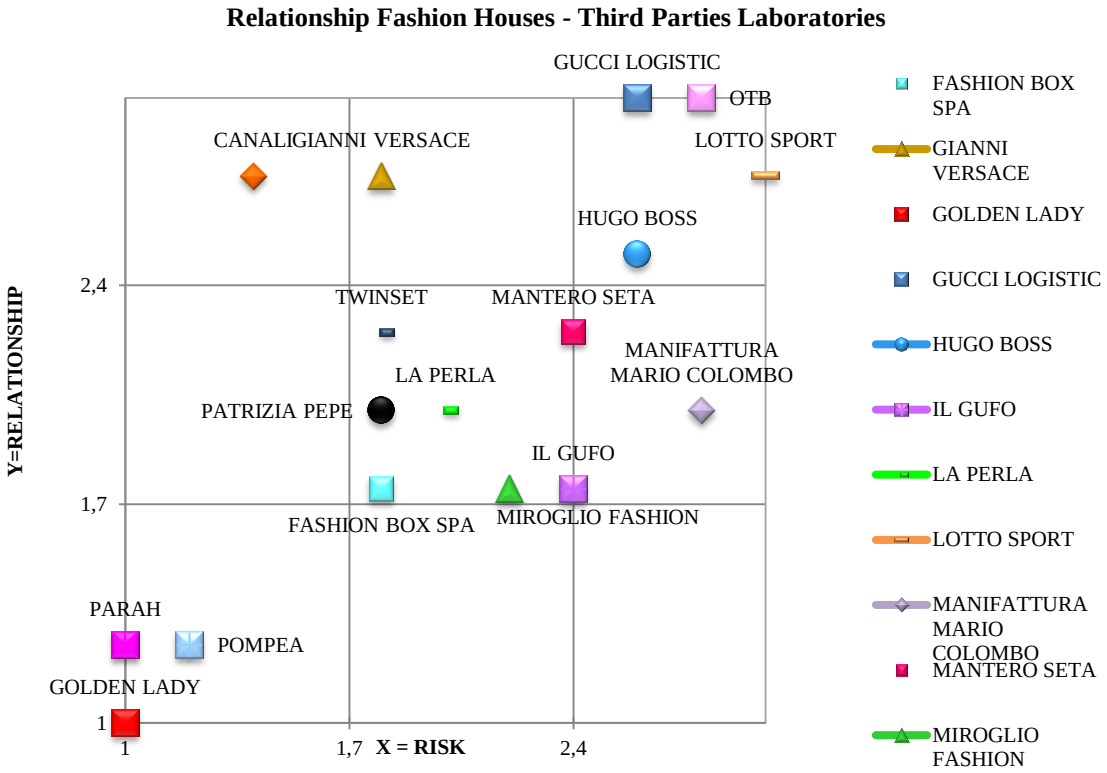


Figure 67 – Respondents Positioning in the Matrix.

5.3 Results Analysis

5.3.1 Cluster identification

Once analysed the reasons for the distribution of the companies and the impact of the different variables, the research moves ahead considering the technologies used by the companies. The ones that are positioned in the same area of the graph are featured by the same technologies, to support the exchanges with the third parties. As show in the diagram, the results are quite interesting: the companies are distributed in five main clusters.

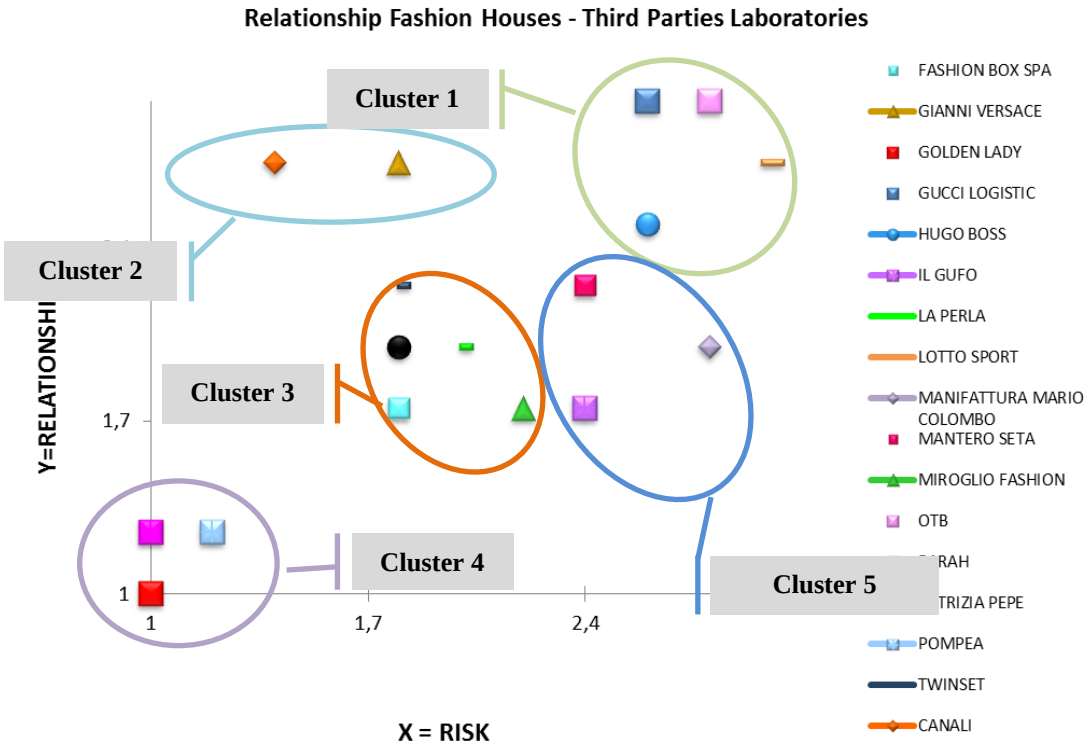


Figure 68 - Cluster identification.

5.3.2 Cluster Investigation

CLUSTER 1: High risk and strength relationship cluster.

The cluster is featured by and advanced utilization of web platform, to maintain scalability and flexibility with different functionalities**.** It is composed by companies that can have high impact

over their supply chain and an accepted and consolidated suppliers' base. The risk is high probably because of the distribution of the suppliers worldwide and the necessity to control their work, even if there are distances obstacles, cultural and timing obstacles. However working at international level allows to assimilate the latest techniques, the possibility to have a reduction of production costs. The main necessity of this group of actors is trying to maintaining control and visibility over the supply chain without forgetting the need of product innovation, because they share pretty much the same supply chain's features. OTB, Gucci and Lotto are part of this cluster.

- *Lotto.* In order to interact with the international suppliers the company, is relying on a specific web platform integrated with the internal ERP system for the allocation of the order, the monitoring of the advancement of the production, the joint product development with the real time feedbacks by the major suppliers.
- *OTB.* In order to interact with small Labor Suppliers, the company has built a platform with advanced functionalities, it allows to: have visibility of the main commission to the suppliers, monitor the advancement of the production and register the result of the control of quality, in order not to have delays in the deliveries.
- *Gucci.* In this final case, the platform is featured by important functionalities such as monitoring the advancement of production by micro-phases, allocation of the commission to the supplier more available, sharing of technical data about the main items and CAD drawings.

CLUSTER 2: Medium risk and high level of strength in the relationship.

It is featured by high investment of the relationship, considering the low level of risk and high investment in the relationship. The cluster is composed by companies that rely on a fixed network of suppliers, mainly spread in the same district or with a high level of control by the Fashion House. The level of risk is decreased by the restrained number of suppliers and by the fact that they are all selected because of particular certification of quality and sustainability. The necessity of the companies is to increase the integration. Considering these important factors in the clusters there are companies like Canali and Gianni Versace, that manage their valuable supply based formed by skilled artisans.

- *Versace.* The company is relying on a network of trustworthy suppliers because they are able to certify the level of quality and at the same time. In order to maintain the exclusive supplier base Versace has implemented a structured web platform where not only the

exchange of the orders took place but also the uploading of quality and sustainability certifications.

- *Canali.* It is not properly part of the cluster because it is featured by a low level of risk in the supply chain, considering the fact that it is working with few suppliers n Biella disctrica. However, the interest of the company in increasing the level of integration is high thanks to the introduction of the XML language, specific for the district.

CLUSTER 3. Medium risk and medium strength in the relationship.

The cluster is featured by firms that are using web platform with simple functionalities, just covering the execution processes. The cluster is formed by companies that have not the power to impose a strict control over the supply chain, that's way the Relationship Strength decreases. The Supply Risk is decreased by the low number of suppliers used and by the fact that are spread near the company, however they are mainly small entities fragmented with very low digital culture with limited visibility over the processes. The necessity of the companies is the increasing control over the production processes, in order to keep in line with the main criteria of quality. The main players in the cluster are Patrizia Pepe, Miroglio, Twinset, La Perla, Fashion Box Spa.

- *Patriza Pepe***.** It relies on a network of few suppliers that uses two platforms. One used to check the quality control and the other one used to communicate the advancement of production.
- *Miroglio.* It uses a simple web base platform with few functionalities, like the order allocation, confirmation and exchanges of invoices. Technical information about the products is exchanged by mails.
- *Twinset.* It has web platform with the small suppliers for the simple exchanges of models and drawing, while e-procurement platform with the great suppliers of the Far east.
- *La Perl**a*****.** It utilizes with the supplier base of web platform and e-commerce platform for the order negotiation.
- *Fashion Box.* The company is located in the cluster for the increasing integration for the joint product development with the supplier, allowed by a web platform.

CLUSTER 4: Low risk and low strength of the relationship.

Companies with elementary form of communication just exchanges of mails and phone calls to cover the basic execution processes. In this group, there are companies that relies not on a fixed

base of suppliers in order to keep in line with the need of the collections. According to this premise, it is immediately clear that the Relationship Strength is low due to the impossibility to gain solid connections with the suppliers. The Relationship Risk is decreased by the fact that the suppliers are usually performing very simple task and not core activities, that's why they are easily changeable. A deep integration, in terms of joint investment in technology and joint production planning, seems quite difficult to realise. The companies in the cluster are Pompea, Golden Lady and Parah.

- *Parah.* The majority of the exchanges with the main suppliers are sent by email or telephone, in order to maintain the flexibility.
- *Golden Lady.* Orders managed by sales agent, while simple exchange of documents sent by mail.
- *Pompea.* No utilization of structured information, just communication by email and telephone.

CLUSTER 5: High risk and medium strength in the relationship .

Companies with high risk of supply and medium strength of relationship. In this cluster, there are companies with high supply complexity and low integration and collaboration between the parent company and the supply base. The supply network is not enough controlled by the Fashion House, due to the absence of common vision and the lack of digital culture. Considering these important factors, in the clusters, there are Manifattura Mario Colombo, Mantero and Il Gufo that manages complex reality with elementary tools.

- *Manifattura Mario Colombo.* Nowadays Colmar is considered part of this cluster, due to inefficient collaboration support tools. However future projects will move the position of the company up, increasing the Relationship Strenght with the suppliers. The main project are the development of a web platform to assign commissions to different suppliers and the automated control over the advancement of the production.
- *Mantero.* The company is part of the cluster for the good level of digital culture. The need of mitigate the supplier risk will introduce new digital projects, that will move the company left on the matrix. In particular, the implementation of a web system will enable the exchange of more structured information with the suppliers and the advancement of the production with the main milestones.
- *Il Gufo.* The parent company has high decision power on the Labor Suppliers on the purchase of raw material and the processes to be performed. However, it does not use

sophisticated digital tools for communication, just e-mail and phone calls, that do not allow the visibility along the production. The risk is high because each product is manufactured by many suppliers, that perform small machining and there is no interaction among them.

Finally, below there is a resume of the Companies' position in the matrix and the main e-collaboration tool used by them, with reference to the cluster they belong to.

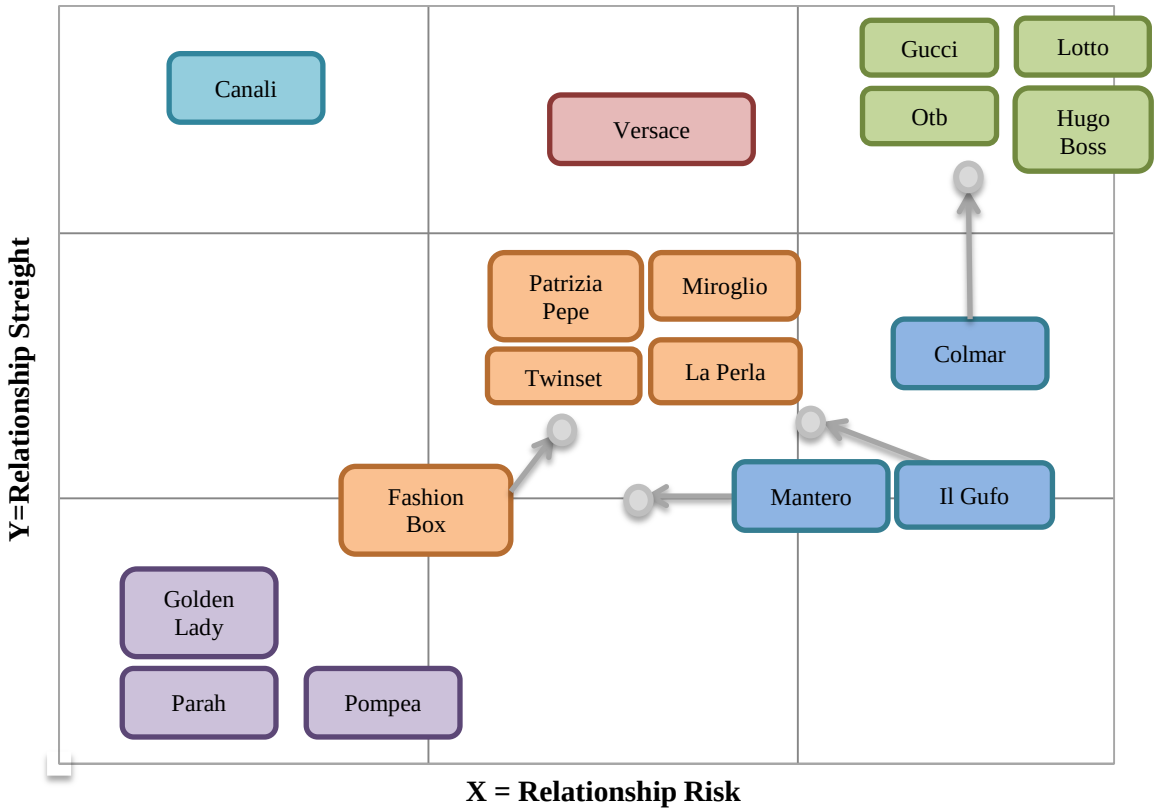


Figure 69 – Respondents Position in the Matrix

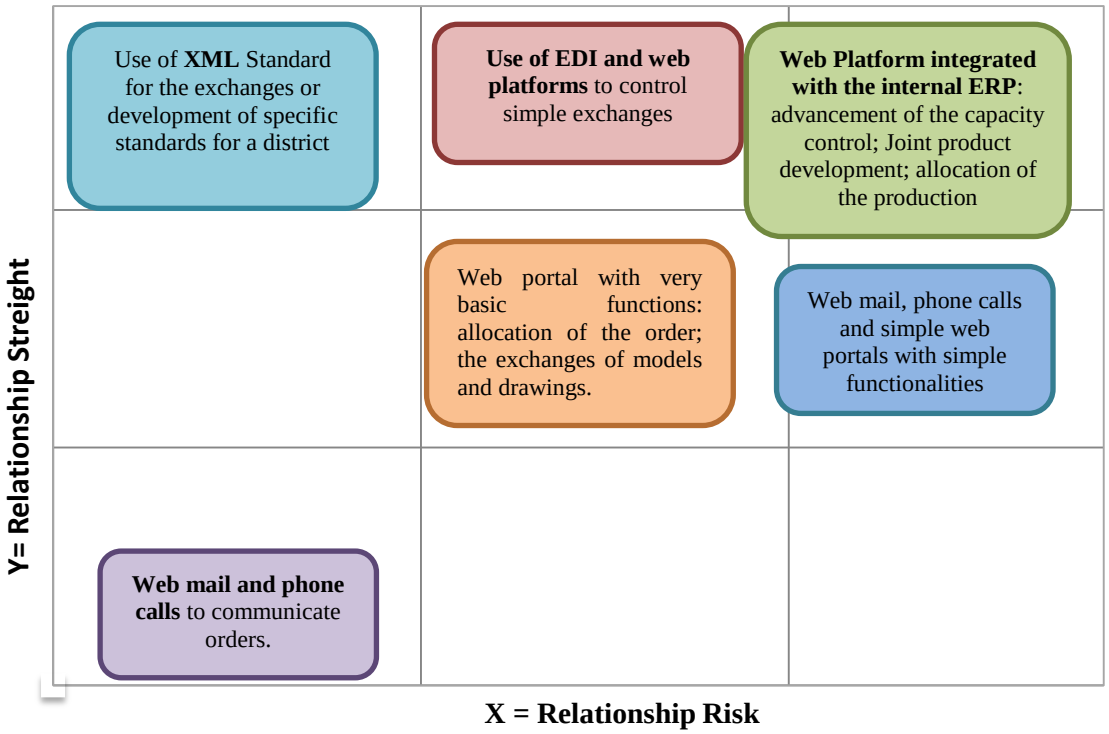


Figure 70 - Respondents Cluster identification.

Appendix_V

Canali Spa

Canali Spa was born in 1934, it produces luxury men's clothing. Each item of clothing is realized thanks to the accuracy and craftsmanship. Canali's values are easthetic perfection, reseacrh of innovative styles. Methicolous attention to the details and the use of selected material.

COMPANY	**CANALI S.P.A**
Address	Via Lombardia 17/19 Sovico MI 20845
Company Web address	www.canali.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	200 mln €
Number of Employees	5000
Position in the Supply Chain	Producers
Suppliers	Raw material, Finishing suppliers, Intermediate product supplier
Customers	Owned shop(35/40), Franchising shops, Department store, E-commerce
Interview date	10/05/17

Supply chain structure

Canali Spa conducts the main activities internally thanks to the Italian artisan tradition, however the there are raw material supplier: basically for the textiles and accessories, then there are finishing suppliers that are commissioned specifically by the style offices and finally the intermediate product suppliers that realise part of the production.

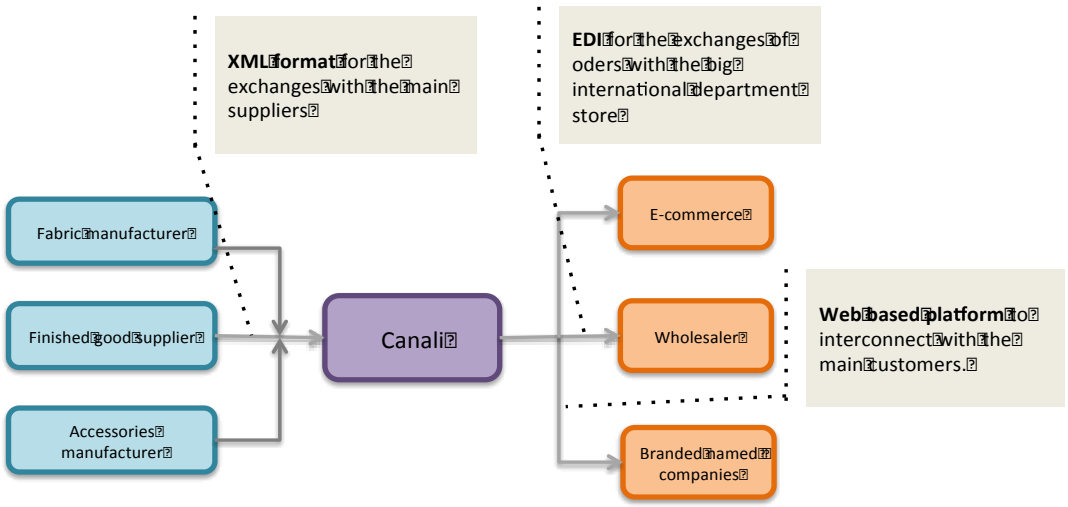


Figure 71 - Canali Supply Chain

Digitalization projects

Upstream. As part of the project Moda ML, the majority of transactions with raw material suppliers are conducted by specific XML format developed for Biella district. The technology allows Canali to speed up the process of order confirmation.

Downstream. A web based platform integrated with the internal information system is used to share the selection catalogue and to monitor the sell-out data. A web based platform is also used with the franchising shops that purchase the majority of the goods during exhibition in showroom, but they can repurchase the item of the collection chosen for the season online. An EDI format is used to support the exchanges of order with the big American department store.

Digital Management System and digital Transport System.. As for the internal digitalization the company is executing internal preservation of the invoices but it hasn't introduced a digital invoicing system yet. The transportation is conducted by internal courier for Italy while with foreign logistic provider for international deliveries. The exchanges with the logistic provider are conducted by the XML format. The transport documents are continuing to be carried with the goods.

Benefit and criticalities. Some benefit can be found thanks to the introduction of XML to make more efficient the order invoice cycle. The integration with the small Labor Suppliers is not so simple because most of them are not structured or they don't have digital system inside to undertake the change. Moda Ml standard is a project that is declining because the standard didn't spread as expected. The aim of the company is trying to obtain more integration between the creative office and the small Labor Suppliers in order to develop new innovative products. At the same time the focus in also on the digitalization of the documents.

Clerici Tessuto & Co Spa

Clerici Tessuto is a company recognized worldwide in the luxury sector, it produces clothes for man and women but also accessories and design for collection peculiarity. It was founded in 1992 and today is controlling the entire textile finishing cycle. The growth was allowed thanks to the capability of the company to exploit the excellent tradition of the artisan in "Como district".

COMPANY	**CLERICI TESSUTO & CO SPA**
Address	Viale Belvedere 1/A 22070 Grandate (CO)
Company Web address	http://www.clericitessuto.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	630 mln €
Number of Employees	270.280
Position in the Supply Chain	Producer
Suppliers	Third party, Raw material supplier
Customers	Fashion houses
Interview date	31/03/2017

Supply chain structure

Clerici Tessuto is connected with the big international but also Italian Fashion houses. The production is mainly conducted internally: with around 100 frames for the production of textiles, so the level of vertical integration is high for the company. There are 10 suppliers, in the same district of the company, that are not exclusive. Sometimes, the fashion house according to the specific commission, indicates to the suppliers from which producers select, the raw materials or parts of the production.

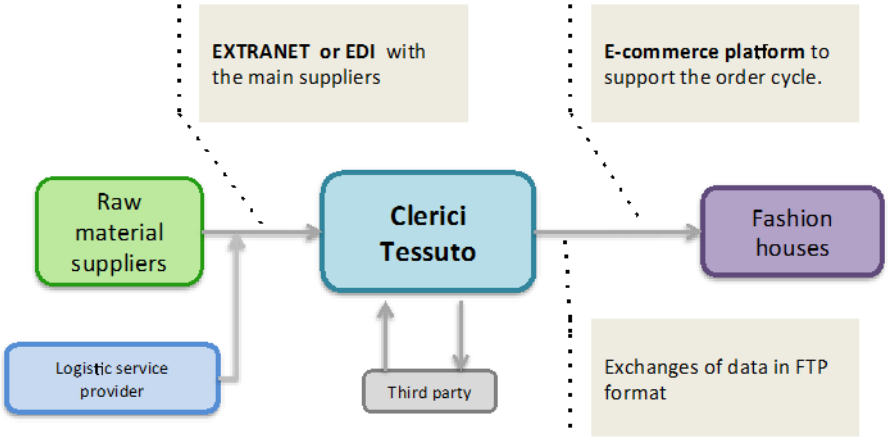


Figure 72 - Clerici Tessuto & Co Spa Supply Chain

Digitalization projects

Upstream. As for the relationships with the small number of supplier the company since 2001 was part of a project called "textile Italy" with the main aim of creating a market place inside Como district. The majority of transaction according to the project, had to be executed in a digital way in order to speed up the execution processes. The project was not a success because the main important player that had had the possibility to sustain it, encountered financial problems. The small suppliers because of the low level of revenues had not the possibility to maintain the expenses for the implementation of the software and also Clerici Tessuto couldn't impose the standard also for the exchanges with the fashion houses. Today the company interacts with the small suppliers with simple mails, while with the occasional suppliers that are structured by file in Edi format.

Downstream. The Company with the customers can work in two main ways:

- The client gives the model: the model is represented in a FTP format by the big fashion houses, however because of the great dimension of the file the time for the download of the documents is very high. Clerici Tessuto has already proposed to the customers particular web base solution to make more easy this specific phase but they refuse because of security issues linked to the intellectual property right.
- The client chooses among the samples: the customer can look to the new collections by moving inside the central warehouse of Clerici Tessuto that has a part specific for the exhibition or by entering in a web base portal. The portal is an e-commerce platform, form which the customers can make their orders. Nevertheless, the presence of the portal the majority of customers prefer to enter in the warehouse in order to check directly the quality

of the product and the material. The 20% of the revenues are made by the visits to the warehouse, the 75% of the revenues are made by the sales agent that visit the customer with the catalogue of the items and finally the 5% are made online.

Digital management system. From 2012 the company has implemented a system for the conservation of active and passive invoices that are around 17000 for the active cycle and 25000 for the passive cycle. The company has renewed the MRP system presents in the main warehouse in order to have real time data about the level of stocks and offer a better service.

Transportation system. The transportation document are archived in the system but a paper copy is emitted in order to go with the goods. As for the express couriers, the phase of acquisition of the items' invoice is done in automatic by the scan of the bar code.

Future Projects. The aim of the company is to implement a system to make the phase of quality certification more efficient. The fashion houses are interested in the quality certifications but in order to obtain them is necessary to have reliable information, that can be obtained by functional web portal. The data inside the portal must be structured and it is the customer that chooses the main fields that the supplier must fulfil.

Ermenegildo Zegna Holditalia Spa

The group is one of the most important example of the Italian family tradition and one of the most important brand in the luxury menswear brand. Ermenegildo Zegna founded the first woollen mill in 1910, in Biella, at the foot of the Alps, whose vision was to create the world's finest textiles through innovation and the sourcing of the noblest fibres directly form their market of origin.

COMPANY	**ERMENEGILDO ZEGNA HOLDITALIA SPA**
Address	Sede legale via Roma 99/100 13835 Trivero (BI)
Company Web address	www.zegna.it
Business Sector	Consumer discretionary
Industry	Apparel and textile products
Sub industry	Textile & textile products
Turnover	1,6 billion €
Number of Employees	10000
Position in the Supply Chain	Manufacturer
Suppliers	Yarn suppliers, Fabric suppliers, Leather manufacturer
Customers	Retailers, Wholesalers, E-commerce
Interview date	10/04/17

Supply chain structure

One of the most important feature of the company is the high level of vertical integration with a direct control from fabric to clothing and distribution. Four generations of Zegna family have succeeded to lead the company by focusing on innovation, sustainability and balancing craftsmanship with technology. Today the company is spread worldwide (100 countries) with 524 stores (307 company owned).

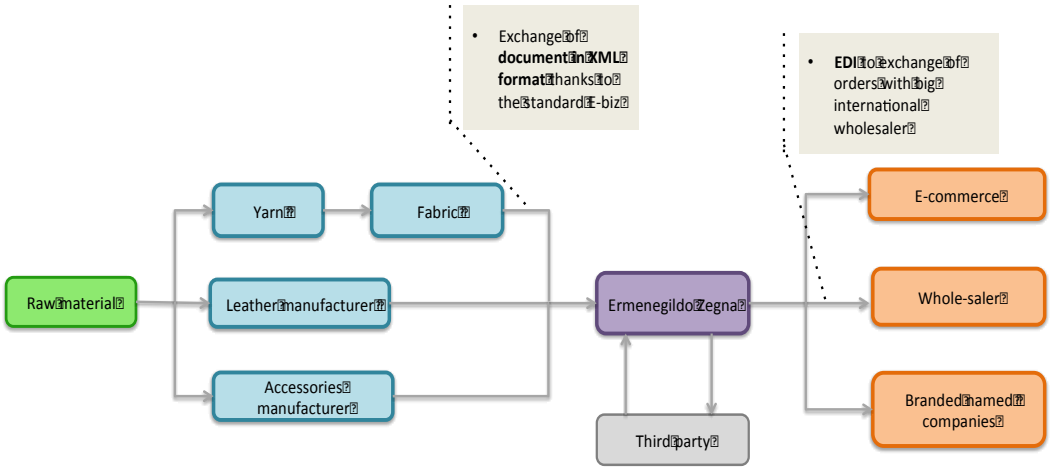


Figure 73 - Ermenegildo Zegna Supply Chain

Digitalization projects

Upstream. To connect with the network of suppliers especially: yarn, fabric and leather manufacturer suppliers, the company has put in place a web based solution to exchange documents in an XML standard specific for the industry. The standard adopted is the one of the project Moda ML and it is called e-biz. Zegna group is one of the first participant to this project whose main aim was to create a standard to facilitate the exchange of orders among manufacturers and suppliers in the textile sector. The platform allows the company to support the order cycle, exchange specification about the product, monitoring the advancement of the production and exchange of the sample in Cad format. As for the accessories suppliers the company is adopting internet solution but the documents are not in XML standard.

Downstream. EDI standard is implemented with the big international wholesaler but also is adopted a standard customized solution (the XML standard called e-biz) for other important customers of the company. As for the small clients that can't implement information system, they can use a web based portal "order entry web" that can be used to direct the orders by logging on the portal.

Future Projects. It is interesting from the point of view of the collaboration process to start working in sharing the material specification of the collection from the main suppliers, in order to avoid all the input process of the information. The creation of new collection start every six months, so every six months the product specification must be corrected starting from the

information that the suppliers bring to the company, and it is a huge task to input all the records in the system.

Benefit and criticalities. The adoption of the standard between Zegna and the suppliers are:

- Reduction of mistake in data entry;
- Increase the process of management of the information, reduction of duplication of activities, elimination of wasting time in the management of the information;
- Increase of the functionality of the ERP and the possibility to monitor the production.

Even if the e-biz standard was set by the European Union, its adoption is still limited in Italy even if the projected started ten years ago, different suppliers today refuse its adoption. The main criticalities are the fact that is complex language and the lack of incentives for the companies to install it.

Fashion Box Spa

Fashion Box SPA was founded in 1981 and is one of the most important company in the denim sector, with the headquarter placed in Asolo (Treviso) is specialized in men's, women's and children's casual wear, accessories and footwear. Innovative flair, characteristic Italian design and the superb quality of its products, have always been three cornerstones of Fashion Box SPA's philosophy. In addition to distinctive skill and expertise, this has made the Italian group a major player in international denim styling and production.

COMPANY	**FASHION BOX SPA**
Address	Via Marcoai 1, Loc. Casella 31010 Asolo (TV) Italia
Company Web address	http://www.replayjeans.com/it
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Clothing
Turnover	200 mln €
Number of Employees	500 employee
Position in the Supply Chain	Producer
Suppliers	Finished product supplier, Yarn, fabric manufacturer, Leather manufacturer
Customers	Mono brand, multi brand point of sale, E-commerce
	220 single brand stores , 5000 multi-brand point of sale
Interview date	31-03-2017

Supply chain structure

The downstream side of the supply chain is characterized by the presence of 200 hundred owned shops, multi-brand stores and wholesalers. Great part of the revenues come from the direct channel 80% , 20% from the indirect channel and only 2% from the e-commerce platform. Upstream fashion Box spa is interacting with a network of suppliers fabric, leather manufacturer and small Labour Suppliers that realize only some part of the production process because 50% of the production is realized internally. The other part of the production is commissioned to finished good suppliers that can receive specific guideline from the fashion

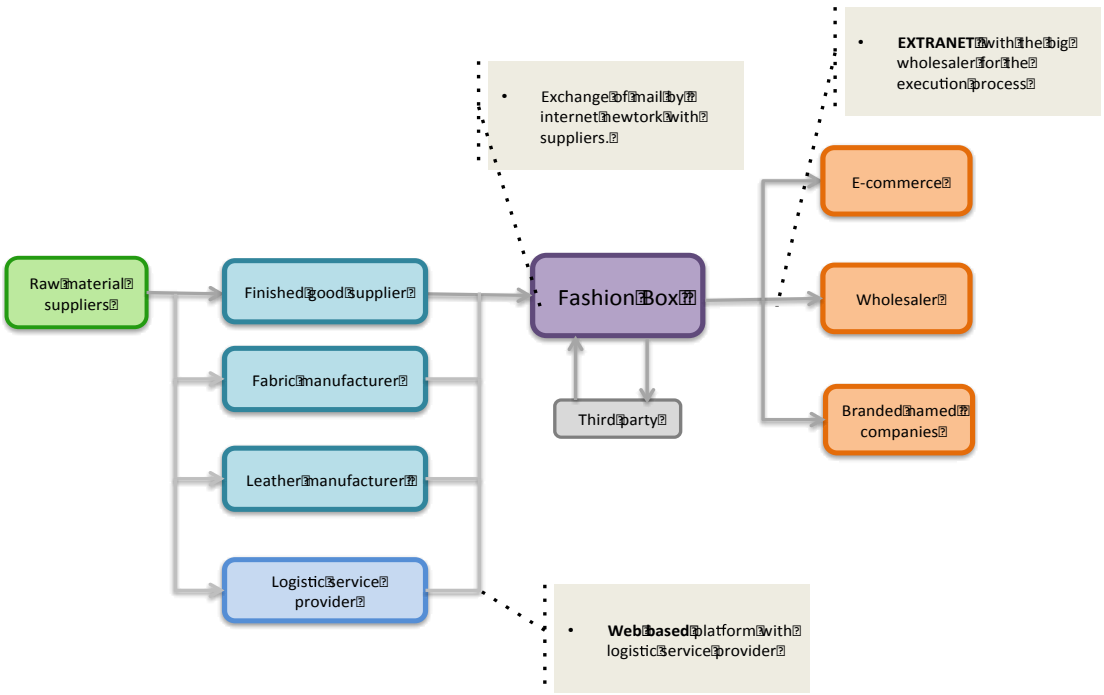


Figure 74 - Fashion Box Supply Chain,

houses on the raw materials that need to be purchased in a way to maintain the quality of the final product.

Digitalization projects

Upstream. Nevertheless the company is international it hasn't got particular internet platform to exchange orders with the network of suppliers. The order invoice and payment cycle is realized by a simple exchange of mail. When the order contains detailed specification about the product the exchange is realized by files uploaded on a cloud space. The advancement of the production is communicated also in this case by mail or phone calls, and the data are inserted in the ERP system of the company

Downstream. Most of the supplier are not structured to receive digital invoice. Only with big international retailer, Edi is adopted to support the execution process.

Digital Transport Documents. The company relies on specific logistic service provider that are divided according to the geographic area. The company has integrated the internal system with the Lsp in order to track the delivery of the goods.

Future Projects. The company want to focus on the internal digitalization to increase the control and the visibility first inside, to increase the performance of the employee by the exchange of updated information. They want to introduce an extranet web based platform with the main supplier in order to support the product development. The platform will allow fashion Box to obtain the features of the module of the product from the supplier in order to facilitate the process of quality certification.

Gianni Versace Spa

Gianni Versace it is one of the most important international Fashion Maison and it represents a symbol of luxury and Italian lifestyle. The company designs, realizes and sells: clothes, jewels, watches and collection peculiarity for home. The group is spreading the products all round the world throw 180 owned boutique and 1500 multi-brand stores.

COMPANY	**GIANNI VERSACE SPA**
Address	Via Manzoni 38, Milano 20121 Italy
Company Web address	www.versace.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	670 mln €
Number of Employees	2500
Position in the Supply Chain	Producers
Suppliers	Energy supplier, Raw material suppliers, Finishing supplier
Customers	Owned shop, E-commerce, wholesaler
Interview date	25/05/17

Supply chain structure

The group is relying on a network of different suppliers: raw material suppliers especially for textile and accessories that have all the skills to certify the quality of the products. Finishing suppliers are around 300 they can deliver directly the finished product or they can complete some part of the production. The model of the item is realized internally thanks to the style office for the first lines. As for the second lines the models are developed by third parties. the distribution of the product is conducted by a network of owned shops, the e-commerce channel that accounts for 3.7% and wholesale customers.

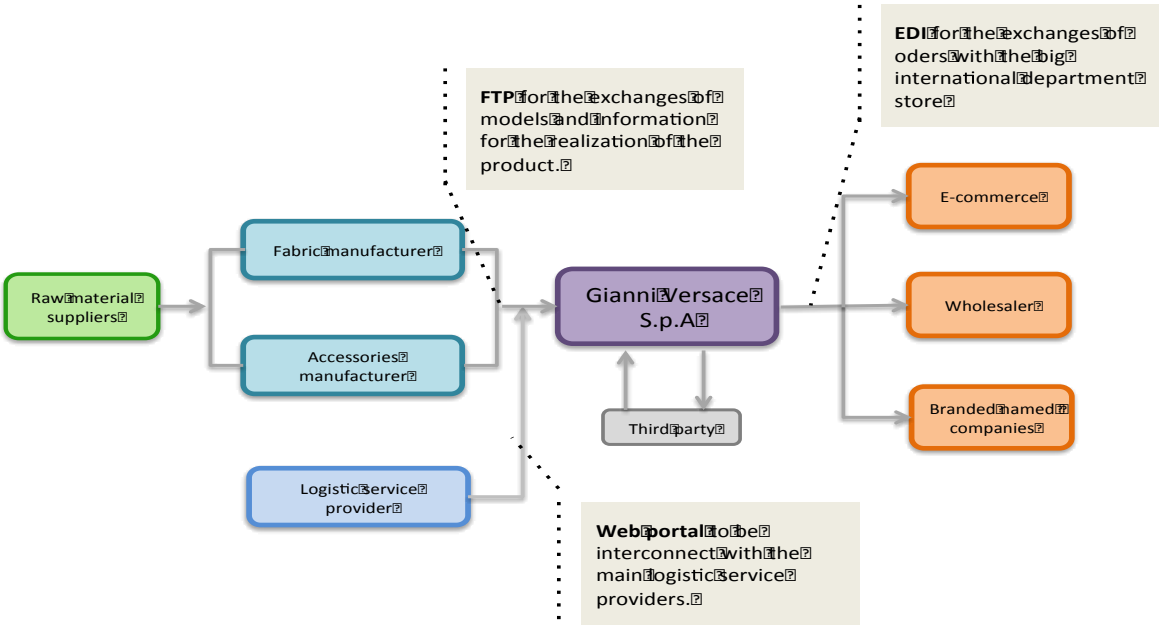


Figure 75 – Gianni Versace Supply Chain

Digitalization projects

Upstream. A web based portal is used by the finishing product supplier in order to manage the order cycle, to control the advancement of the production and to receive a support form the group in case of lack of raw materials. The certification of sustainability are also obtained by a web portal that is used for the collection of all the information and questionnaire sent to the different suppliers. The format FTP t is used to exchange the models that are designed throw a CAD system by the style office for the primary lines. As for the second lines of models these are developed by third parties and sent to the suppliers always in a FTP format.

Downstream. EDI is used to exchange the order information with the main American department stores., while Web base portals are integrated with the main owned shops, allowing the support for all the process of sending orders, visualize the level of stocks inside the main warehouses and exchanges of sales report.

D**igital Management System and digital Transport System.** They have implemented a system for the digitalization of all the documents except active and passive invoices. They work with logistic service provider and they are using their internal web portal in order to maintain the visibility over the delivery.

Future Development. Future projects will be aimed at:

- Improving the integration with the main suppliers for the new product development but also for the sustainability issues;
- Increase the traceability of the products by RFID in order to monitor the final product;
- Increase the covering of the internal documentation system in order to digitalize passive and active invoices;
- Upgrade the internal application for the management of the suppliers and the sales.

Benefits and criticalities. The main benefits obtained throw the integration with the main suppliers is an increase in information reliability that will facilitate the project of certification and of authentication of the main products. The level of internal digitalization is quite high but must be increase in order to cover also the invoicing processes, in order to collect all the data about past transactions. There is the necessity to change the way the models are delivered throw FTP format because it requires time to be downloaded.

Golden Lady Spa

Golden Lady Company is one of the main leader in the production of socks and underwear; the main mission of the company is trying to spread the Italian style worldwide thanks to the brand: Golden Lady, Sisì, Hue, Philippe Matignon and the retail network Golden point.

COMPANY	**GOLDEN LADY COMPANY S.P.A**
Address	Via Giacomo Leopardi 3/5, Castiglione delle Stiviere, MN
Company Web address	www.goldenlady.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Textile & Textile Products
Turnover	300 mln €
Number of Employees	1500
Position in the Supply Chain	Manufacturer
Suppliers	Raw material suppliers, Finishing supplier
Customers	Owned shop, wholesaler
Interview date	09/05/17

Supply Chain Structure

There are three main typologies of suppliers: raw materials, work in progress and finishing suppliers; as a consequence it is clear that the production is part in outsourcing. The Style office is in charge of the realization of the sketches that are later delivered to the different suppliers. As for the downstream side of the supply chain there are three main channels: wholesalers, small shops and GDO.

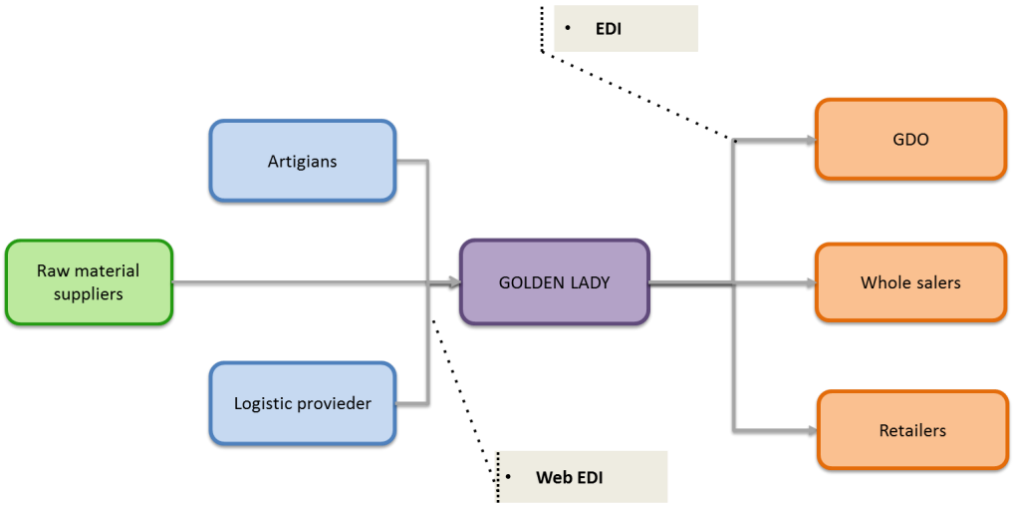


Figure 76 – Golden Lady Supply Chain

Digitalization projects

Upstream. The communication with the supplier is conducted in a simple way by simple exchanged of mail and phone calls. In the case of finished product suppliers the management of the catalogue is conducted mainly by sales agents.

Downstream. The level of digitalization is higher: in order to collect the orders some agents with tablets are sent inside the shops to collect weekly information about the sales and arrange new orders, all the information are sent to the internal digital system. The communication with GDO is conducted by EDI format to support the execution processes.

Digital Management System and Digital Transport System. They have implemented a system for the digitalization of all the documents. The transportation documents are still delivered with the goods.

Future Projects. There are no future projects to enhance collaboration in the supply chain, a more level of integration with the suppliers is not considered necessary.

Gucci Logistic Spa

Gucci Logistica SpA manufactures leather products. The Company produces leather products including handbags, luggage, shoes, belts, wallets, sunglasses, perfume, watches, scarves, hats, gloves, and other clothing accessories. Gucci Logistica serves customers internationally.

COMPANY	GUCCI LOGISTIC SPA
Address	Via Don Lorenzo Perosi 6 Scandicci, 50018 Italy
Company Web address	www.gucci.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Textile & Textile Products
Turnover	1, 23 billion €
Number of Employees	150/200
Role	Producer
Suppliers	FabricS, 12 Shoes manufacturers, 40 Leather manufacturers, Accessories manufacturers
Customers	Gucci World Wide
Interview date	30th of march, 2017

Supply Chain structure

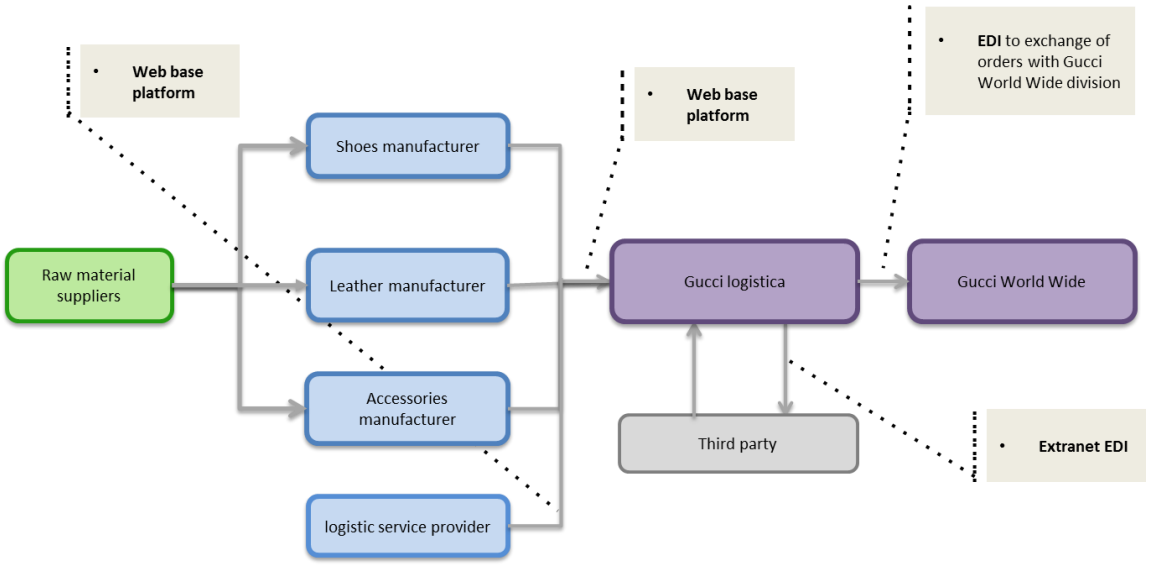


Figure 77 – Gucci Logistica Supply Chain

Digitalization Projects

Upstream. Gucci Logistica works with a complex network of suppliers, made by 40 leather manufacturers and 12 shoes manufacturers. They don't have exclusive relationships with Gucci Logistic, however they consider it as a good and reliable customer, for this reason they build a strong relationship several decades old.

- *Microsoft XL Dynamic Information Management System:* It is a structured is not just a platform for factories is some more: an information management system to homogenize all the practices. Suppliers receive all transactional data (separate commissions / transactional documents) and administrative document (invoices);
- *Web based Collaborative Platform:* Gucci Logistic implement the platform for all the collaborators (40 actors), it is web-based and for this reason it's accessible by everyone. In this platform, they share data and information like timetables, the work progresses expectations, distinct basic, technical information (CAD drawings or product templates). The suppliers are passive actors, they can only receive data and distinct basis, that they can't change; they must share information about actual Production capacity, and based on this data Gucci assign the orders. In case they are not able to cover it or they are not in time, Gucci can decide to not overload them with new orders or to assign the job to another supplier. Gucci Logistic is also able to control the production progress considering only the Macro-activities, for example Cutting – assembly – packaging, each of them lasting for days. Once the suppliers accept the order they received all the information, and they can see the availability of materials the stock level throughout the system to carry out the work (during the production planning). In case of out-of-consumption losses, they have the possibility to reintegrate materials but there is no digitalized process supporting the activity. They will extend the production process control to the micro phases. Right now it is not possible because each actor breaks down production cycles in different operations, and the software is considering just one standard.

Digital Transport System. Collaborative transport platform. Transport is managed by means of Gucci Logistics on the Tuscan territory (20%) and by means of third parties providers. Couriers are constantly monitored by mobile devices, and suppliers accessing the platform for which they charge access to the platform can make requests for transportation, assignment of the courier or shuttle that is centrally obtained. Future development: Suppliers will be able to communicate

with the driver of the means of transport. The travel document still travels with the shuttle, nothing has been done yet.

Benefits. The most important benefit is in terms of Digital Cultural improvement: Gucci Logistic helps some small realities to implement advanced tools of execution and collaboration like ERP or SAP. Second benefit is the improving of efficiency and safety of information (direct online flow): all the actors work on the same information. The portal, used to support the relationship with suppliers, helped to streamline the production process and to increase Gucci's visibility on the supplier's business. The Document Management System allows getting real time data, resulting in significant reduction in the time required to carry out the various activities.

Hugo Boss Spa

The brand Hugo Boss is known worldwide as one of the market leader in the premium and luxury segment, it has got two important headquarters one in Germany and the other one is Switzerland. The brand includes the collections of BOSS, BOSS Orange, BOSS Green and HUGO. The brands cover a comprehensive product range encompassing modern apparel, elegant eveningwear and sportswear as well as shoes and leather accessories. Licensed fragrances, eyewear, watches, children's fashion, home textiles and writing instruments round out the ranges.

COMPANY	**HUGO BOSS SPA**
Address	Via Morimondo, 26, 20143 Milano
Company Web address	https://www.hugoboss.com/
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Clothing
Turnover	2.8 billion €
Number of Employees	13800
Position in the Supply Chain	Producer
Suppliers	Fabric and yarn manufacturer, Accessories, Third party
Customers	Retailers, Wholesalers
Interview date	04-05-2017

Supply Chain Structure

The structure of the organization is based on business unit each one for each typology of product. Each business unit has to develop the model, the collection of samples, the planning of the production and the quality control. There are two main typology of supply chain:

- The first one is when the company relies on a network of specialized manufacturer processing under contract that are executing part of the production process. In this kind of

supply chain the fashion houses maintains a strict control over the second tier of suppliers such as fabric, yarn and accessories manufacturer, providing to the small manufacturer the necessary raw material for the production.

- The second one is the "marketed" supply chain, the suppliers are delivering to the fashion houses the final product but the fashion houses has not the control and the visibility over the second-tier manufacturers.

The company undertakes a specific process for the selection of the supplier according to the criteria of sustainability and quality. A team from the fashion house visits the supplier and its plant of production and then a questionnaire is sent. The company can also relies on external society to get the certification of compliance of the supplier. The organizational function that are focused on marketing activities are centralized and they are based in Germany, the majority of the sales come *from 60% from retailers while the other 40% from the wholesalers.*

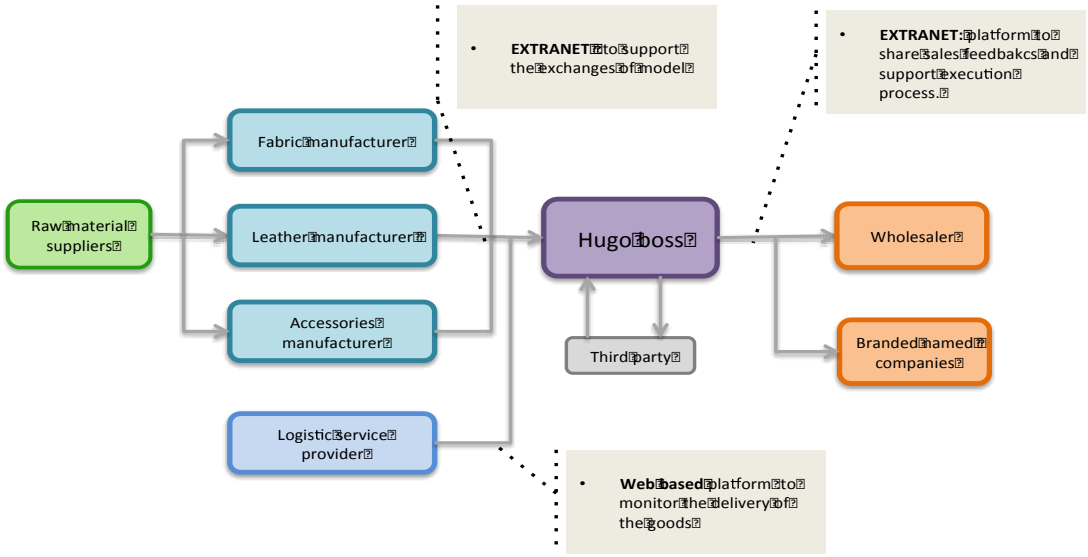


Figure 78 – Hugo Boss Supply Chain

Digitalization projects

Upstream. The company has implemented the exchanges of information with the strategic and structured supplier throw the Edi standard. The process supported by this technology are both execution (order-invoice –payment cycle) but also collaboration exchanges of samples and technical details about the product. Basically the company exchanges the print and the drawings

of the new model of clothes of the final product. With the small suppliers the process is more simple and it is based on the exchanges of mails.

Downstream. The company is using a portal to support the process both with the wholesalers and the retailers. The company exchanges with the wholesalers data about the products that are requested, book of the internal collection and the wholesaler is exchanging the feedbacks from the market about Hugo Boss products.

Internal digitalization. The company has already implemented a system for the digitalization of active and passive invoices. They are implementing a system for the automatic control of the invoices.

Digital Transport Documents. Hugo Boss relies on logistic service provider to control the delivery from the suppliers to the fashion houses and also from the fashion houses to wholesaler and retailers. The suppliers are directly uploading the documents of transport on the portal shared with the LSP.

Future Projects. All the digital solution are realized internally, the aim of the company is to increase the downstream relations with the wholesaler by adding functionalities to the digital portal.

- In particular they are realising an e-commerce B2b platform in order to show in advance to the wholesalers the new collection and allowing them to buy the items of clothing;
- they are piloting an e-procurement portal with the suppliers.

Il Gufo Spa

Il Gufo is a company recognized internationally in the production of luxury clothes for children until 14 years old. The headquarter of the company is in Asolo and it is a small artisan reality, it is spread in 30 countries with mono brand owned shop and multi brand shops. The main objective is to guarantee the growth by pursuing the care for each phase of the production process. The main values are: quality of the raw material, details perfection and exclusivity of the manufacturing.

COMPANY	**IL GUFO SPA**
Address	Viale Galileo Galilei 3/A Asolo, 31010
Company Web address	www.ilgufo.it
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	30 mln €
Number of Employees	80
Position in the Supply Chain	Producer
Suppliers	Third party, Raw material supplier
Customers	Fashion houses
Interview date	08/05/17

Supply Chain Structure

The company controls all the phases of the development of the product, prototyping thanks to an internal style office, raw material and accessories selection and purchasing. The logistic function is in charge of controlling the distribution of all the essential material for the production. The control of the quality of the product and the outbound distribution is also controlled by the company and the items reach: owned shops, franchising and multi brand store. The phases of production are assigned to different small artisan Labor Suppliers that are specialized in the specific task.

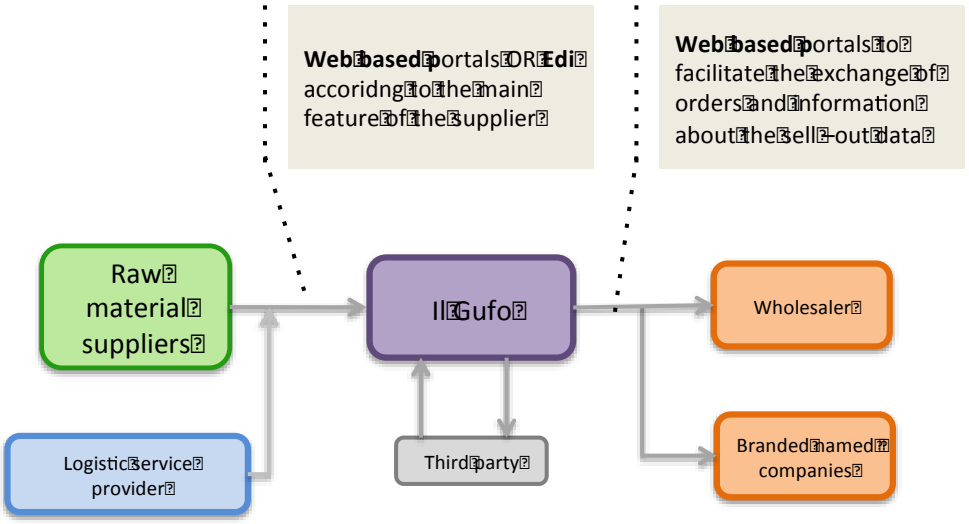


Figure 79 – Il Gufo Supply Chain

Digitalization projects

Upstream. As said previously the different phases of the production are assigned to different suppliers so the presence of a documentation is important to keep track of the different activities already executed on the specific item. Once the small laboratory finishes the phase of production the work in progress is delivered to the fashion house that checks the quality of the producing. After that the item is delivered to the following Labor Suppliers to take on the other phases. The Labor Suppliers can't exchange information among each other. Il Gufo has the responsibility of bringing the necessary information for executing the process. The notice of advancement of the production are made directly by phone or email between the fashion house and the supplier. The process of production is definitely complex, only the fashion house can have the complete overview of the execution of the different phases. Il Gufo is interacting with two main suppliers that are in charge of accomplish the cut phase, with these two industrial entities that are quite structured, the company exchanges information by EDI format. The fashion houses makes the placement of the production for both of the two suppliers automatically thanks to the technology. As for the purchasing of raw material suppliers, the purchasing agents following the suggestion of the style office make the selection of the materials. The order are made directly by the internal system of the company to the supplier by mails.

Downstream. In this part of the supply chain there interesting digital solution:

- Mono brand owned shop: the shops have the possibility to access a platform that is integrated with the internal system of the company. The main flow of information is concerned about sell out data, item records;
- Franchising shop and multi brand shops: make their order by a particular platform that is integrated with the internal system of the company. The platform allows to visualize the level of stock inside the warehouse and it is mainly used to manage the seasonal assortment and over production situation. There is also another platform that s used by the sales agent where they can put directly the quantity ordered by the customers during the showroom exhibition.

Digital management system. The level of internal digitalization is quite high, thanks the integrated platforms with the customers. The orders are collected from the big department store or shops and the MRP system is able to make an automatic production planning. In addiction the purchasing function can receive a specific documents with all the quantities of raw material that are necessary collect in order to start the process of production. Nevertheless, this important advancement in the organization of the production the company has not yet introduced a system for the digital preservation.

Transport system. There are different cases according if the delivery of the product is conducted in Europe or in countries extra Europe. In Europe during the delivery, a paper document is created, that is travelling with the goods, for consignment to the customer specific logistic provider are used and the company uses their portal to track the delivery. In the extra Eu contries is the customer that is arranging the delivery.

Future Projects. One of the interesting possibility seen by the company to start investments in tracking the raw materials in order to facilitate the process for obtaining the certification of quality. The project will introduce a web platform integrated with the supplier, system of the company and their entities that will be in charge for the control, in order to obtain a structured information about the origin of the different textiles. The system will allow also, to gain a more precise product record.

Intersport Italia Spa

Intersport Italia S.p.A. provides sports goods. The Company offers wholesale distribution of sporting and recreation goods in Italy. the largest network of sports goods stores - has nearly 500 affiliated stores in Italy. Intersport Italia SPA is linked by a shareholding and a trademark licensing agreement to Intersport International Corporation. the bond with Intersport International guarantees to Intersport Italia highly privileged relationships with the main brands in the sector (Nike, Adidas, Puma, Reebok, ...); These previous strong partnerships that, in sales outlets, result in always-updated, complete and competitive assortments. Since 1997 in Italy, thanks to strong international collaboration and synergies, as well as to the deep integration between central Italy and individual retail outlets, assortment and service in Intersport stores meet the needs of all types of consumers. Intersport's activities, traditionally linked to the selection of suppliers and product lines, as well as the centralization of purchasing and logistics, have progressively evolved and enriched with new content. Today, it also extends to management consulting, training and marketing services.

COMPANY	**INTERSPORT ITALIA SPA**
Address	Via del Tuscolano 17/2, 40128 Bologna (BO)
Company Web address	http://www.intersport.it/
Business Sector	Consumer Discretionary
Industry	Industry: Distributors – Discretionary
Sub industry	Sub-Industry: Other Wholesalers
Turnover	500 mln €
Number of Employees	11-50
Position in the Supply Chain	Wholesalers
Suppliers (150)	Small - Medium Sportswears Producers, Big Sportwears producers, Intersport international
Customers	Affiliate Stores, 140 Cisalfa Owned Stores, 400 Cisalfa Fraincising
Interview date	11th of april 2017

Supply Chain Structure

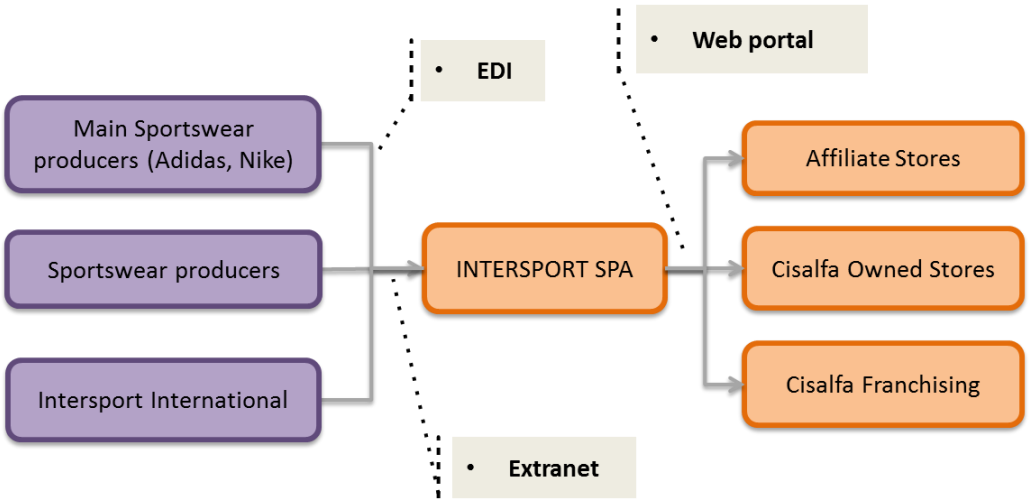


Figure 80- Intersport Supply Chain

Digitalization Projects

Upstream. It is possibile to classify the different retail actors in the following categories: Intersport international, Small medium Sportswears Producers and Big Sportwears producers. Pushed by the main suppliers Intersport have just completed the purchases centralization process project. It is aimed at centralizing the management of good using an existing Intersport warehouse. The project will allow all the affiliates to send, in digital format through the already existing web portals, all their orders which will be collected by Intersport. Intersport will send the orders to the suppliers, who will still send invoices to Intersport. Then the suppliers will receive batched orders which will be send with electronic transport documents, in the Intersport's centralized warehouse. Intersport still managse the re-invoicing process, but together with that, it is also responsible of delivering the goods to its affiliates based on the original un-merged orders. This solution will allow to make easier the relationship between suppliers, Intersport and affiliates, since it will follow a much structured and organized process.

- *Extranet.* Focalizing on the relation between Intersport and its affiliates is necessary to understand the practical role of the former to understand the digitalization processes putted in place. The affiliates send their orders directly to suppliers using a variegate set of methods, which varies according to the possibility of the single company, and they receive the goods directly in the point of sales without any intervention of Intersport. However,

Intersport role is crucial because suppliers do not invoice the goods to the single company, but to the central buying entity – Intersport – which is later responsible for re-invoice to its affiliates. Intersport receives the invoices from suppliers in a heterogeneous format: trough EDI, using a VAN for the data exchange, other are received in XML proprietary or in PDF. No matter how the invoices are received they are all translated into the Intersport's proprietary XML and are automatically recorded inside its applicative system. Intersport has also implemented an Information digitalization project aiming at managing, on top of the previous mentioned processes, also the usage of electronic delivery notes, eCatalogues and selling out report with stock level.

- *EDI:* Intersport has in place an EDI channel to exchange flow of data with some of the biggest producers (Adidas and Nike). Flows supported are both ways since the channel is used from suppliers to send invoices and from Intersport to send orders for Intersport's shops and orders of other affiliates during selling periods. EDI channel is used by suppliers to send digital transports documents which avoid the manual control in charging the received goods inside the internal systems.

Downstream. Intersport has three main group of clients to manage the affiliate store (which uses Intersport as a mediator between them and sportswear producers); the Cisalfa stores (part of the same group of Intersport) and Cisalfa franchising stores. This complex nature of downstream supply chain of the company makes complex and crucial the management of this side, in term of invoices payment and also of defining general contracts. **Extranet:** Affiliates use web boarder to carry out the re-invoicing process: they can download all their invoices using credentials (username and password) given by the company, The same portal is also used by Intersport to collect purchasing orders from its affiliates during selling periods (usually from 5 to 6 times per year).

Document Management System DMS and Digital Archiving. Since 10 year ago the group formed by Intersport and Cisalfa is using digital preservation to archive almost all its fiscal and legal documents. Active and Passive invoices, transaction logs and company employment register are digitalized by using an external partner responsible for managing the digitalization process.

Benefits and future developments. Document management system helps the company to increase the quality of fiscal documents management. All the digitalization solutions implemented by the group, from EDI connections to web portals till to the usage of electronic

Delivery Notes has allowed a sharp reduction of time spent in receiving controlling and charging goods in the system. The Extranet platform will be extended also to other retailers (not only the main Branded actors). This is the most important project because it will create a perfect management (100% order deliveries and confirmations), but it is important to understand the degree of interest in centralizing the process.

La Perla Srl

La Perla was founded in 1954 by Alda Masotti, today is a brand leader in the production of lingerie. In 2013 the company has become part of the group Pacific Management. La Perla releases collection for women that by lingerie, beachwear and accessories want to show their smart style.

COMPANY	**LA PERLA SRL**
Address	Viale Luigi Majno, Milano 17
Company Web address	www.laperla.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	140 mln €
Number of Employees	5000
Position in the Supply Chain	Retailer
Suppliers	Core supplier (part of the production), Non core supplier (accessories)
Customers	Multi-brand, Department- store , Owned shop (170)
Interview date	10-04-17

Supply chain structure

La Perla is distributing its own collection by a network of mono-brand shops inside the main fashion cities, by multi-brand shops and big international department stores. La Perla distinguishes between two kinds of suppliers core and non core, the first are the ones more strategic and featured by frequent transactions while the second one are commissioned for part of the production.

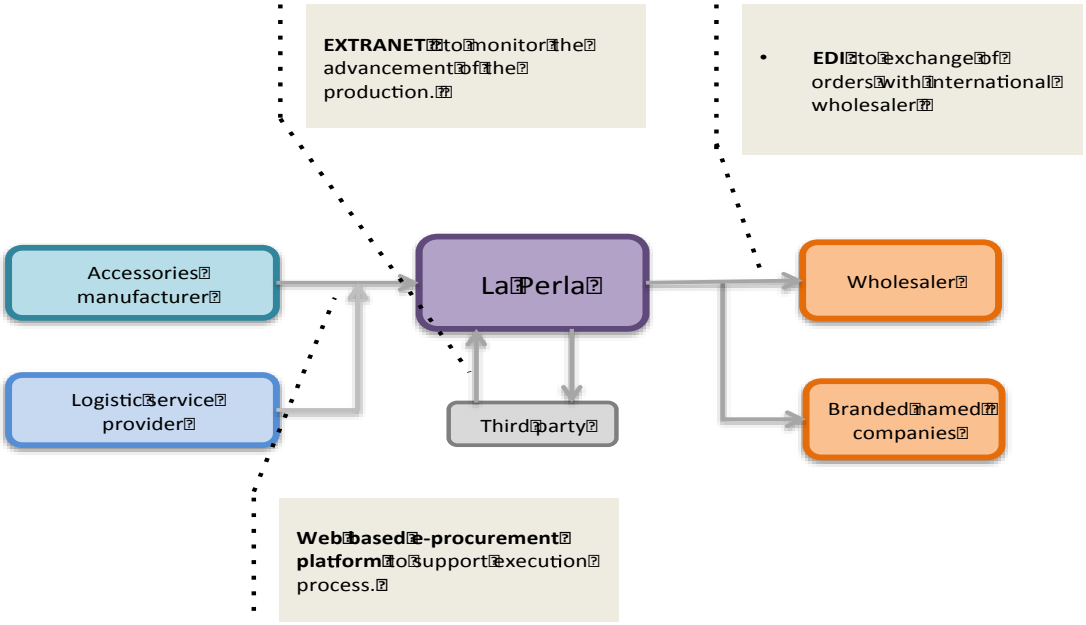


Figure 81 – La Perla Supply Chain

Digitalization Projects

Upstream. With the network of 50 core suppliers the company has implanted a web based platform that allows the control of the advancement of the production. While with all the other supplier an e-commerce platform is used to manage the purchases. In the e-commerce platform once the supplier obtains the commission can insert data about how its production will be performed and the expected time to deliver the goods.

Downstream. As for the project with the big departments store that are responsible for the 15-20 of the sales, also in this case the company under analysis has implemented an EDI system with the support of an external provider.

Digital management and transport system. Internally La Perla is going to introduce a document management system next year for the conservation of all the invoices. The company is maintain the transport document on paper because of the problem with the council, however it is using an internal portal with the owned store to insert the Advice shipping notice in order to make them aware of the delivery of the products.

La Rinascente Spa

Founded in 1865, La Rinascente is a high-end store chain selling the best fashion, home, accessories, design and food products. In Italy, the chain counts on 11 stores (Milan, Turin, Genoa, Monza, Padua, Florence, Rome, Cagliari, Catania, Palermo), but it is also present outside Italy with the Illum name. The company stores sell a huge variety of high hand brands both made in Italy and internationals. In its 150 years' history, la Rinascente has enjoyed moments of great success and has always lived up to the fame of its Brand, but most of all it has been able to read the signs of time, changing direction at the right moment and becoming a point of reference for high quality shopping. It sells products of about 1500 brands, some of them belonging to the same fashion house (1100 suppliers).

COMPANY	**LA RINASCENTE SPA**
Address	Via Washington 70 , Milano, 20146 Italy
Company Web address	www.rinascente.it
Business Sector	Consumer Discretionary
Industry	Retail – Discretionary
Sub industry	Department Stores
Turnover	€ 570 mln €
Number of Employees	1400
Position in the Supply Chain	Retailer
Suppliers	100 Fashion Houses
Customers	1 200 000 habitual customers
Interview date	7th of April 2017

Supply Chain Structure

La Rinascente is a retail company and for its nature it does not produce anything, for this reason the supply activity is very important. There are three main type of relationship that La Rinascente builds with its 1200 suppliers, each of them splits the responsibility and the property of the goods between the actors in different way:

- Fixed account: It represent the “Traditional mode”. The Rinascente defines the assortment of the references to keep in their stores and buy the goods by issuing orders towards suppliers.
- Concession: Companies own a corner within one or more points Sale in The Rinascente. In this case, the choice of the assortment, the definition of the Selling prices, purchasing, stocks, and orders management are fully charged by the trademark holder. Salespeople within the Corners are not employees of La Rinascente but are hired and managed directly by the Brand Company.
- Deposit Account: This is an intermediate solution between the previous two: the management of the reorder is a responsibility of the vendor who receives daily data, sales report and all the information necessary for the proper functioning of the Re-supply. Based on the received data and the previously intercepted agreements with La Rinascente, the vendor issues a proposal and, if accepted, starts the replenishment process. The goods remains the property of the vendor until it is sold to end customer by La Rinascente.

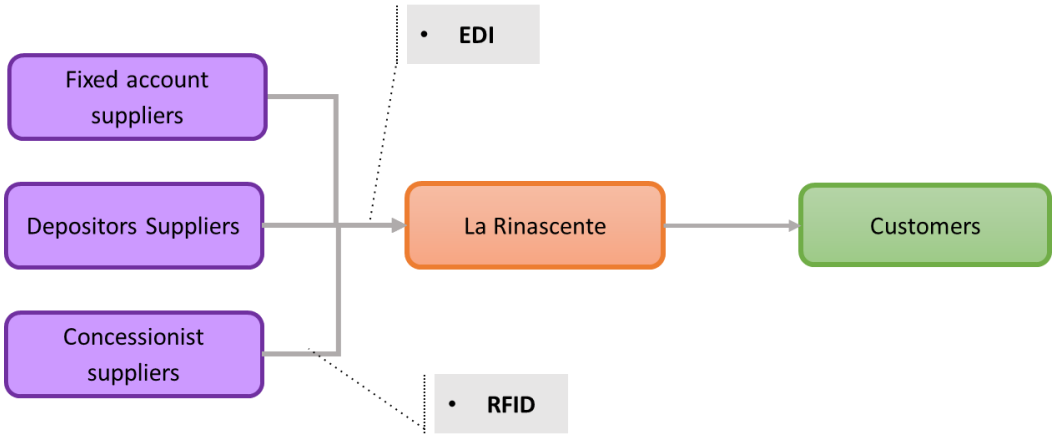


Figure 82 – La Rinascente Supply Chain

Digitalization Projects

Upstream. Data exchange via EDI is a project begun in the late 1990s. Rinascente manages through EDI Eancom 65 suppliers over 1100 (45 of which responsible for about 30% of yearly purchases). The EDI project was promoted by functional logistics and purchases with the support of the business summit. Logistics was interested in the possibility of exchanging electronically the delivery bubbles, while Purchasing function was interesting for possibility to exchange personal data, orders and order proposals in case of management in Deposit account.

In addition to these documents, La Rinascente also exchanges electronically the daily sales reports data, which are made available to all suppliers in EDI. The Exchange of this type of data represents a form of collaboration, that goes beyond the simple transmission of the documents of the cycle order via EDI. These information includes data of the sales, broken down by code, date and point of sale are in fact very important for suppliers because they allow them to have an overview of daily sales and visibility on market demands. As for invoices, on an annual total of 80,000 documents, about 6,000 are exchanged via EDI. However, the billing process is outsourced to Accenture and, consequently, electronic invoices do not pass through systems of La Rinascente. La Rinascente implements a project for all the suppliers with a Confession-relationship selling in the Duomo Department Shop to eliminate traffic around the department store during the replenishment. For this reason, La Rinascente opened an Hub in San Giuliano, where the goods are collected, tagged by la Rinascente and sent to the Central Department using La Rinascente's carriers. This project enhances a small collaboration between the parties. On one side it helps La Rinascente managing the traffic that all the Brand carries would have generated around the Departement Store and on the other side also Brand Companies received a zero cost service, reduction of wasting time with high visibility on the tracking and security issue.

Document Management System (DMS) and Digital Archiving. La Rinascente is using a document management system for all the passive documents received, to make easier the storage and management of documents. Moreover, with the aim of reducing paper documents and the physical space to archive them, from 2006 La Rinascente is using Digital Preservation to archive passive invoices (about 75.000 documents per year) and warehouse's books (about 13.00 per year). The management of invoices received through EDI as well as the one of the invoices received though traditional channels, is outsourced to an external supplier responsible for managing Preservation and for paying suppliers.

Digital Transport System. The EDI channel is also used to exchange delivery notes with suppliers of shipping service. The exchange of digital format, however, has not substitute the paper format of the delivery note which is still sent in paper format. Thus La Rinascente is receiving EDI flows which inform it that goods are traveling, but the paper format is always sent by suppliers as a double check. Considering the about 57'000 delivery notes exchanged each year, about 27'000 are send via EDI. Thus about half of the shipments directed to the company are previously communicated by using EDI channel.

Benefits. EDI has enabled La Rinascente to obtain two substantial types of benefits: Efficiency recovery and improved information quality. With EDI projects, La Rinascente started building more collaborative relationships with its suppliers.

- Increased efficiency and effectiveness.
- Information quality upgrade. Thanks to the exchange of structured flows of data, it is possible to insert product information at single item level obtaining a punctual data which is more reliable and useful. This punctuality is not achievable if the company should have managed its backhand process without the support of its suppliers.
- Collaborative solution with its suppliers allowing to manage better products. The sales reports, sent from La Rinascente towards the Brand Company, allows the visibility of market needs and behaviour. This class of suppliers, thanks to point of sales visibility, is able to send via EDI order proposal which, in some case, are transformed directly into Purchase Orders from La Rinascente without buyer intervention (this mechanism is particularly used to manage fast fashion products since their suppliers have enough production capacity reactiveness).

Criticalities.

- Difficulties in the spread of EDI. Although many of La Rinascente's suppliers are big producers with a well-structured organization they are not willing to adopt EDI. The problem lies mainly in the fact that such projects are managed centrally. Since these suppliers operate in many countries around the world and the Headquarters are located abroad, the development of a EDI for a small reality like Rinascente is not taken into account. In addiction in the world of luxury, unlike other sectors, the focus is not so much on efficiency but more on other aspects, such as quality. Consequently, the introduction of EDI is often out of focus by the luxury companies.
- Need to standardize processes. The introduction of EDI implies standardization of processes that, if not done correctly, it is likely to worsen the order cycle performance. The management of any errors / problems should also become critical: it is much more complex to go back to the causes that have generated them.
- Internal criticism. From the point of view of the internal organization, the introduction of the EDI did not generate technical problems. The real challenge is having a clear idea about how the processes should be modified and how the organization should change. (change management)

Lotto Sport Italia Spa

Lotto was born in 1973, it is an Italian brand symbol of the Italian sport design in the distribution and production of sportswear. The distribution is wide and it covers around 110 countries thanks to the network of independent shop, specialized chains and big international multi-brand department stores. Beside the Italian style there are other values such as design, innovation and quality.

COMPANY	**LOTTO SPORT ITALIA S.P.A**
Address	Via Montebelluna, 5// Trevignano, TV 31040 Italy
Company Web address	www.lottosport.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	300 mln €
Number of Employees	1000
Position in the Supply Chain	Producers
Suppliers	Finished good suppliers
Customers	Distributors (3000), E-commerce, Owned shop (8), Licensee shop(20)
Interview date	10/05/17

Supply Chain Structure

The headquarter and the warehouse of the company are located in Trevignano, from which they control all the shipments of the goods in Europe. The group is owning commercial branches in Spain and in Italy and as for the purchasing office their are located in Hong Kong and Taiwan because most of the suppliers are located in Asia. Lotto creates the design of the product but the production activities are realized by the foreign suppliers in Asia. As for the downstream part of the supply chain the product are distributed by an e-commerce website, by partnership with great international departments stores, multi-brand and owned shops.

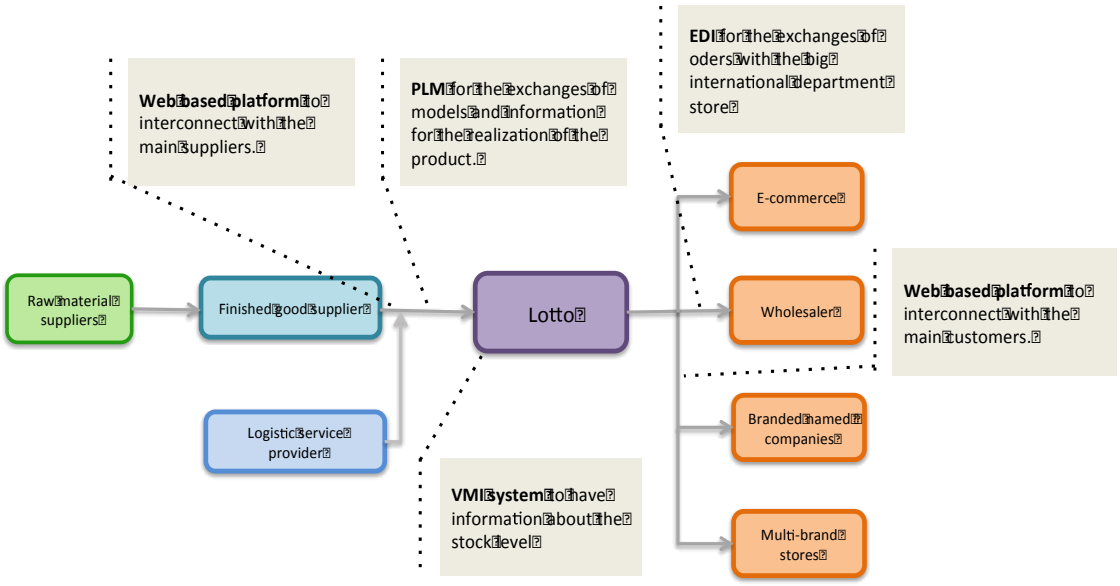


Figure 83 – Lotto Supply Chain

Digitalization Projects

Upstream. The PLM is used to support the exchanges of data about the product that has to be developed by the finished good supplier. The information received contains specification about the different tasks to be performed, the shape of the model of the item, qualitative and also quantitative data about the material that should be used. The supplier receive the information in a passive way and it can't change the model but it can gives feedbacks about the possible problems that can be encountered during the production. The technology in this way can reduce the communication distances with the main service provider in Asia. A web platform is also used to support the order invoice phase , to notice delay in the delivery phase, to notice the completion of the activity and the advancement of the production. The platform is connected with the internal Erp system and the suppliers can also access to download the passive invoices.

Downstream. The EDI format is used for the exchanges with the main international department store to support the order cycle processes. Different portals connect the company with the main typology of retailers, also in this specific case the portals support the execution activity.

Digital Management System

- The company has implemented digital preservation both for active and passive invoices. In particular every week an external provider collects all the paper invoices, it scans them and

it inserts all the invoices in the system. The active invoices are sent automatically form the internal ERP to the provider system,

- *VMI***:** The group has implemented VMI in the warehouses used for the replenishment. The rule that the system is following is the minimal one, if the stock is under a certain limit the item is not showed in the web portal to the customer to order it.

Digital Transport System. The company has got a global supply chain that's why the majority of the shipments (95%) are conducted by sea. The main warehouses are in Asia for American deliveries or Trieste and Venice for European shipments. The transport documents are carried with the goods, however the company is implementing specific application systems that allow to send directly in a digital form the documents to customs.

Future Projects. The company since a year has started a digital journey with different solutions that impact the entire company but also the supply chain. First of all the PLM system with the great aim to increase the collaborative functionalities allowing more integration and speeding up the development process. In order to reduce the communication problems the company is going to implement a 3d prototyping system, that will allow the supplier to have a complete overview of the item that must be realized. The company is pursuing also ambitious projects downstream with the aim of introducing a proprietary E-commerce Lotto platform and unifying all the channels of distribution on a unique system "Omni channel platform". To realise the programme an internal change in all the processes and an upgrade of the ERP system are necessaries in order to integrate the company with the external actors. With the platforms all the customers can monitor what are the most request items according to the countries, they can order for the new collection or allowing a particular algorithm to re-stock the shop. Today the platform is active only for the brand Stonefly as a pilot project but the aim is to extend it.

Benefits and criticalities. The system used to interact with the main Asian supplier receiving immediate feedbacks about the model of the product can reduce the future production criticalities. In addiction the presence of the technology has overcome the difficulties encountered because of the geographical distance of the finished good suppliers. The future projects that the company is going to introduce will bring lots of reconfiguration inside the main process and this could bring an internal inertia to the change. The ERP system used by the company is featured by modules that are very customized so it is difficult to integrate it with the external platform that the company is going to introduce, without a complete investment in the upgrade of the system.

Manifattura Mario Colombo

Manifattura Mario Colombo founded in 1922 with the main famous brand Colmar is leader in the production of sportive and casual clothing.

COMPANY	MANIFATTURA MARIO COLOMBO
Address	Via Olimpia 3 Monza, 20900
Company Web address	https://www.colmar.it/it-it
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	100 mln €
Number of Employees	200
Position in the Supply Chain	Producers
Suppliers	Raw material, Finishing suppliers
Customers	Owned shop (5000), Department store, E-commerce
Interview date	10/05/17

Supply Chain Structure

The company spread its products with multi-brand stores that are around (5000), proprietary shops (10) or department stores. The 70% of the sales are realised in Italy and the second area important for the export is Europe. There is a network of raw material suppliers: textile and accessories; finished product suppliers that receive the guidelines from the style office for the purchase of the material and implementation of the activities for the production.

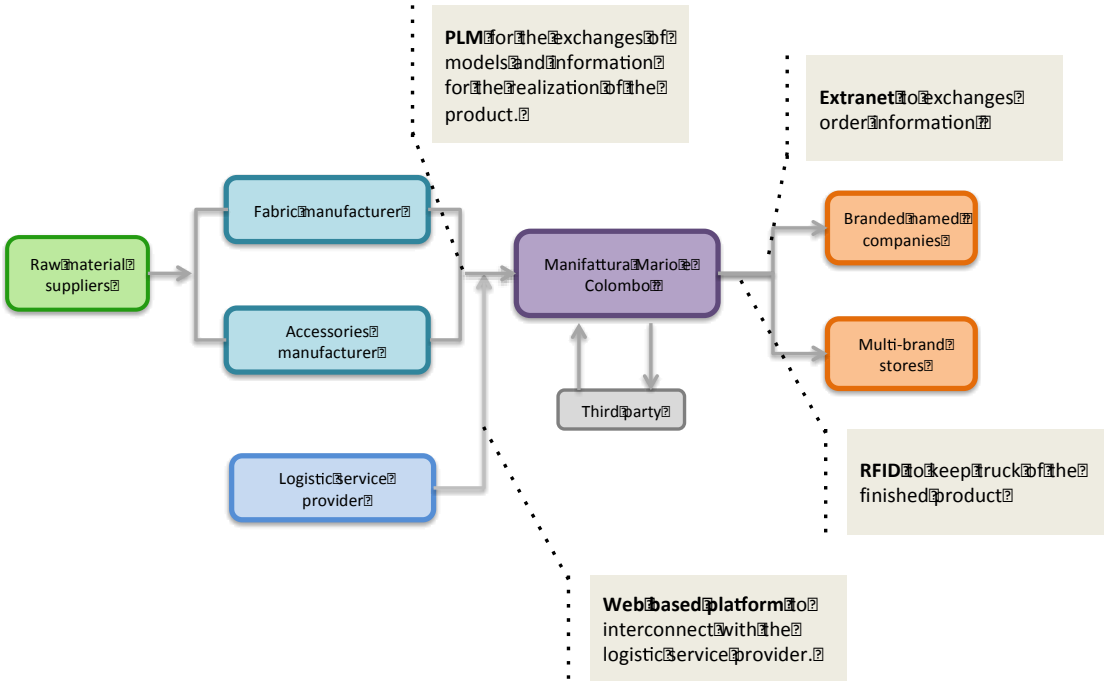


Figure 84- Manifattura Mario Colombo Supply Chain.

Digitalization Projects

Upstream. When the style office creates the collection the PLM system web based is used and the suppliers have the possibility to access it. The model of the item with all the information is uploaded on the PLM system.

Downstream. An extranet system is present with the proprietary shops that can make their orders on the platform interconnected with the internal system of the company, the shop can also visualize the level of stock. As for the multi-brand shop the orders are made throw sales agents that send the order to the internal system. An RFID with electronic tag is implemented in order to keep track of the finished product.

Digital Management System. The company is trying to redesign all the processes, also the ones for the codifications of the product, with the aim to introduce a new ERP system. In order to implement this new tool to allow a better level of integration it is important to adapt to the suppliers' systems. The solution will also allow internal conservation of all the invoices. The company wants to introduce the VMS module that will bring more visibility inside the main warehouses.

Digital Transport System. There is a shared web based platform between Colmar and the logistic service provider that manages the deliveries of the raw material from the warehouse to the supplier that has to execute the process.

Future Developments. They are trying to implement a web portal where the supplier can access the orders, evaluate them and receive all the information. At the same time the company can have data about the suppliers and their production processes. Another important area for improvement is the control over the advancement of the order that now it is done manually and that must be more automated.

Benefits and criticalities. The PLM system implemented is a starting point for the future integration with the main suppliers and the possibility to increase the efficiency for the process of new product development. In addiction, the modernization of the internal ERP is a way to increase the visibility over the supply chain thanks to advancement of the production. The implementation of the new informative system will bring a series of difficulties in the identification of the main important processes, because of the fact that the company has often changed different business models during the years.

Mantero Seta Spa

Mantero Seta Spa manufactures and distributes textile and fabrics. The Company provides men's and women's clothes, handbags, lingerie and swimwears, and printed and jacquard fabrics. Mantero Seta products are spread internationally. It is a modern, integrated company, which prides itself on a solid managerial structure – an undisputed leader in the creation, production and distribution of textiles for men and women. Laying claim to an international customer portfolio – from big-name luxury and fashion brands to companies working in the fast fashion business – Mantero has always stretched itself to the limit in order to offer to eachone of its customers bespoke solutions tailored to suit individual needs.

COMPANY	**MANTERO SETA SPA**
Address	Via Volta 74 Como, 22100 Italy
Company Web address	www.mantero.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Textile & Textile Products
Turnover	75 mln €
Number of Employees	455
Position in the Supply Chain	Producer
Suppliers	Silk suppliers, Labor suppliers, Logistic provider 600/800 Labor suppliers (Extranet with 35 suppliers)
Customers	Wholesaler, Fashion houses
Interview date	30th of march, 2017

Supply Chain management

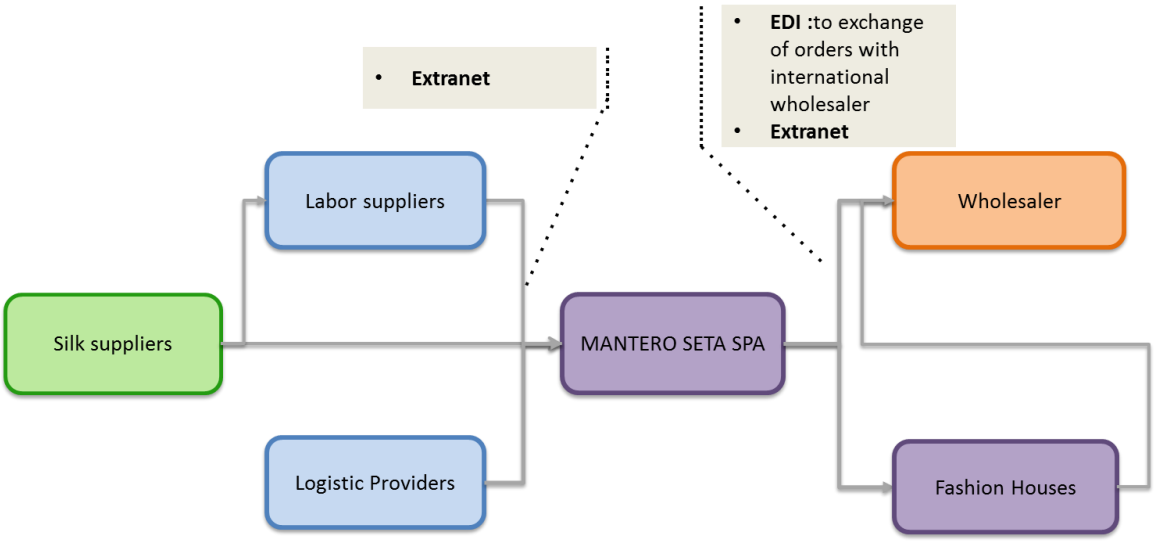


Figure 85 - Mantero Seta Supply Chain.

Digitalization Projects

Upstream. The industry is not developed from the point of view of information systems: they do scarves, that are hand-edged by packers, who in some cases are also quite structured and send bill by email but in some cases they send hand-made bills. One of the constraints of the digitalization of this industry is linked to the small dimension of the realities they are connected. Mantero could only realize an unshaven mining portal, an excel file, with the main structured suppliers, where they have to load on the web portal the bubble on which the finished product is shipped.

Downstream. Some years ago, Mantero Seta started to communicate with main US department stores using EDI. The channel is used from wholesalers to send electronic orders and by Mantero Seta to keep them informed about the shipping progresses of that order and to send to the wholesalers the relative invoices. The wholesalers imposed this solution but Mantero don't appreciate it because it is expensive and that business is becoming very small. Instead, the business is growing with the bigger members of luxury (LVMH, Kering...). and they are implementing portals for product traceability and sustainability policies, to control supplier characteristics. With its main sales agents, Mantero Seta has in place a web portal used to share sales orders. Starting from those same sales orders, the company is than managing the

production sizing. It is a simple solution and the company has not in place any further investment.

Document Management System. From the internal point of view Mantero SPA has implement a project, aimed at digitally archiving all the tests done on tissues. They use a software, borrowed from a specialized pharmaceutical quality control company. There is a database with all the tests done: every year they make more than 10000 different items and only some of them go into production; having the documentary helps to avoid repeating wrong products development phase and testing phase, if already done. In addition, the Italian law is forcing the company to adopt electronic billing solutions, because the benefits of implementing these projects are significant. For this reason, Mantero SPA has proposed a project for 2018, which may be the beginning of electronic billing: in September, the active invoices will be systematize, and the next step will be electronic billing.

Benefits and criticalities. Thanks to the introduction of a document management system to archive quality control reports the company has experienced a drastically reduction in document searching and quality controls phase, due to no duplication of the process - usually done in the past when the company was unable to find quality control's report of already inspected products. The main obstacles for the company to join the digital innovation trend is the lack of adequate internal applicative system and the backwardness of the small reality they are connected with. All these reasons do not allow and give advantage implementing easy solutions such as a document management system. The necessity to renew all the informative system is one of the reason why the company doesn't see in its future any documents digitalization project.

Miroglio Fashion

Miroglio Group is composed by two important divisions: *Miroglio Fashion*: it includes the 11 brands that focus on women clothes such as Elena Mirò, Motivi; *Miroglio Textile:* it was founded in Alba in 1947 with three main plants for the production of fabric, textile and transfer paper and film. We decide to focus our analysis on Miroglio Fashion that is featured by a big handmade tradition of experience , attention to details and utilization of technical innovation as the 3d realization of the models. Each brand emerge with the style and the character thanks also to the contribution of the marketing campaign.

COMPANY	**MIROGLIO FASHION**
Company Web address	http://www.mirogliogroup.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	550 mln €
Number of Employees	4500
Position in the Supply Chain	Producer
Suppliers	Finished product suppliers; Finishing suppliers; Raw material supplies
Customers	Monobrand shop; Franchising
Interview date	10/05/17

Supply Chain Structure

Miroglio Fashion realizes only the prototype of the item but the majority of the process of production is realized in outsourcing thanks to suppliers that realize finished product, these kind of suppliers can choose freely the raw material and the main activities always in accordance with the request of quality of the company. There are also finishing suppliers that receive by Miroglio Fashion the main guidelines to carry out the specific task also the materials. The distribution of the items is realized by a network of owned shops and shops that are controlled by the so called “estimator contract” by which the company control only the technology of the

cash register. Miroglio Fashion owns a warehouse from which the main items pass through to reach all the customer base.

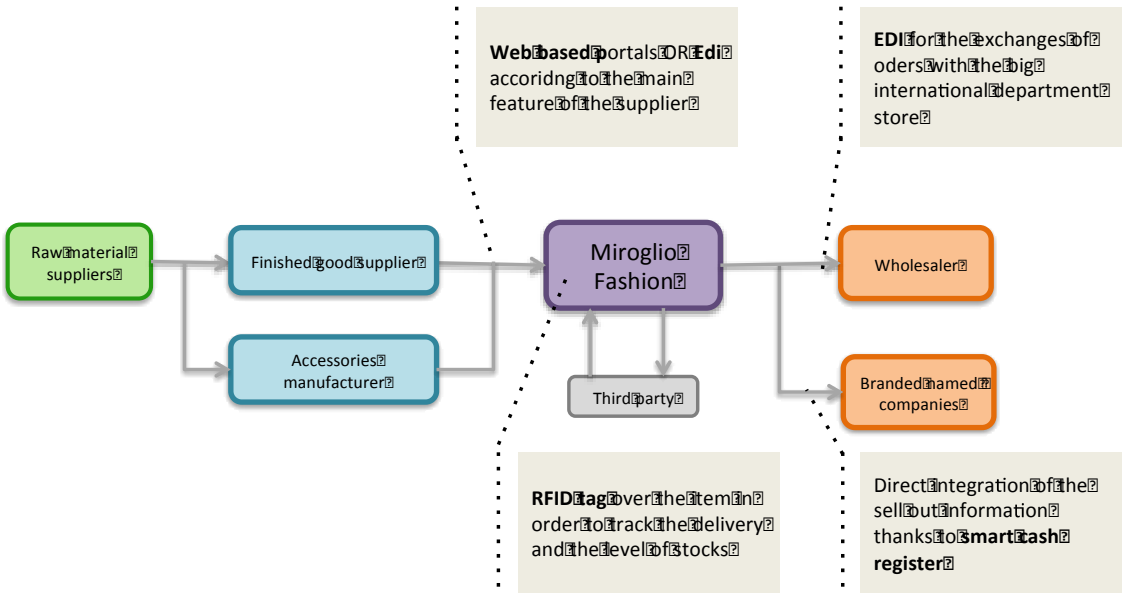


Figure 86 - Miroglio Fashion Supply Chain.

Digitalization Projects

Upstream. In the specific relation with the finished good suppliers there are no specific digital technologies used to support the process with the exception of the invoicing part that is automated. As for the fishing suppliers that must realize part of the production process, they receive a "digital kit" with all the instruction for the manufacturing and technical development. However the material is delivered by simple exchanges of mail. Finally for the raw material suppliers there is a specific web portal to support the order invoice process.

Downstream. The company exchanges with the big international department store file in EDI format for a flow of information about product catalogue and sell out data. In addition it has implemented a project called 4.0 with different areas of improvement:

- **"***Smart cash register"* It is a project that is realized with the network of mono-brand shops and with the collaboration of Oracle. The company is using this system in order to have in real time sell-out data that are directed inside the internal system of the company. The shop is administered by third parties but this information is owned by the company.

- *RFID.* With the project retail 4.0 the company has introduced innovative RFID tag especially for the brand Fiorella Rubino, to track the goods and having information on the stock level.
- *"Borsino project"*. It is a method that on the one hand is exploiting the data that are coming from the smart cash register and on the other hand is exploiting the experience of the personnel inside the shops in order to predict the most requested item.

Digital management system. The company has introduced an internal digital system for the conservation of all the active and passive invoices. As for passive invoices, are directed by the suppliers automatically on the web portal.

Future Projects. The aim of the company is to introduce collaboration system in order to increase the integration upstream with the suppliers. The objective is to renew all the processes for the phase of product concept development by involving all the raw material suppliers that have got the skills and the expertise to drive the correct suggestions for the creation of innovative and original item.

OTB

The group OTB was founded in 1978 by Renzo Rosso, in the years following the mission to "*build products suitable for the personality of customers, developing, challenging the rules and fostering creativity",* the group increased the revenue and the brand portfolio. A part from Diesel in the group there are brand like Maison Margiela, Marni, Viktor &Rolf and two other companies such as Staff International and Brave KId. In the last years the group has undertaken a digitalization strategy with the aim to create a common vision, be the first in the fashion sector to exploit the advantages of the technology in order to be fast and following the preferences of the customers. The new strategy adopted is impacting not only the downstream part of the supply chain creating new ways to interconnect with the customers, but also upstream in the way in which the company is dealing with the supplier base. The objective is to create a digital strategy end to end that involve the entire supply chain.

COMPANY	**OTB**
Address	Via dell' Industria, 2 36042 (VI) Italia
Company Web address	http://www.otb.net
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Clothing
Turnover	1.59 billion €
Number of Employees	10000
Position in the Supply Chain	Producer
Suppliers	External Labor Suppliers, Raw material supplier, Service suppliers
Customers	Retailers, Wholesalers E-commerce, 420 owned shop
Interview date	11-04-2017

Supply Chain Structure

Downstream the supply chain is featured by relation with big wholesaler that represent the 50% of the sales, while the direct shop that are around 420 represent 45% of the sales, the last channel of revenues is the online channel that is suppose to bring more revenues in the future

because of the new digital strategy. Upstream on of the most important relation is the one with the Labour Suppliers that are in charge to realize activities of the production. The result of these activities can have huge impact on the result of the quality of the product, and they are source of competitive advantage for Diesel, in the end because of their strategic role inside the network Diesel has invested a lot to increase the visibility on this relationship. OTB is relying on logistic service provider to get the expertise to deliver the goods on time and at the same time the group has centralized the acquisition of indirect goods in order to create a standardization in the whole company.

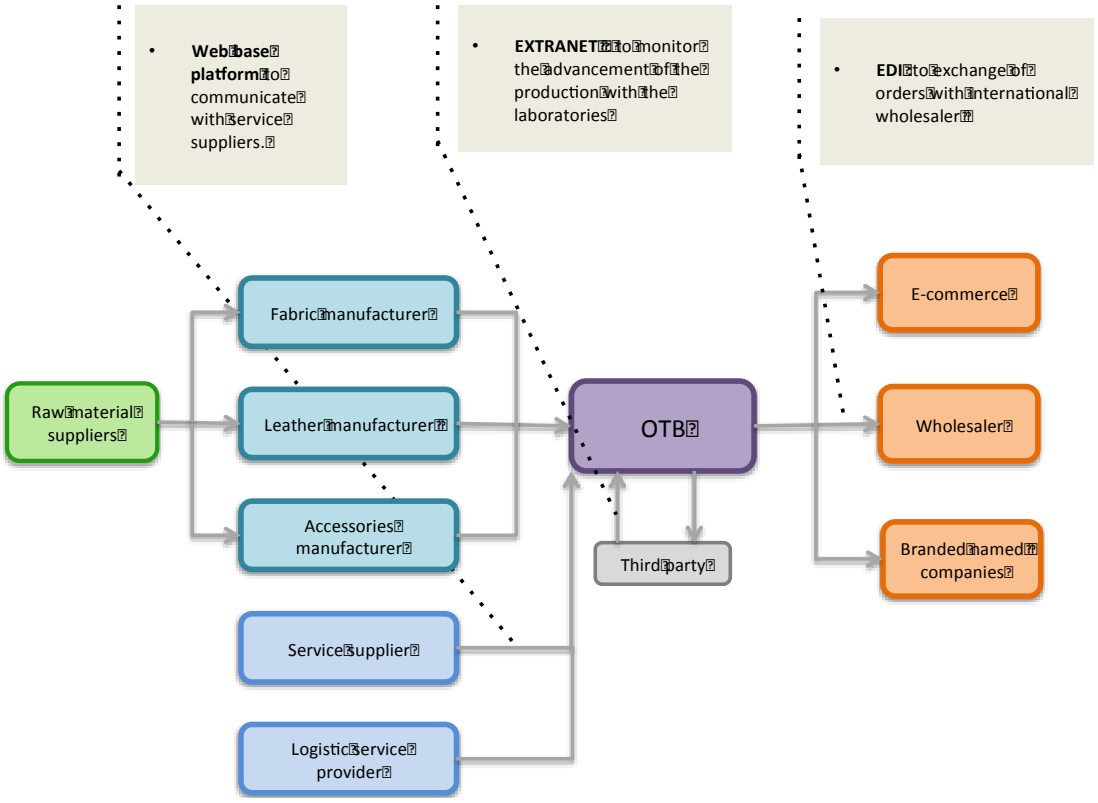


Figure 87 - OTB Supply Chain

Digitalization project

Upstream.

- *Extranet.* As said previously OTB is relying a lot with the small Labor Suppliers and that's why is important for them to know the advancement of the production, in order to realize the object a web base platform is active to exchange information with these small entities. One the main functionalities of the platform is the possibility for OTB to give visibility to the supplier the main commission and to show the deadline for the

delivery. The second important functionality is the possibility for the supplier to register the production milestone and the items of clothing that contains deficiency. In addition OTB is implementing a platform for the acquisition of indirect goods. The suppliers can register to access the platform in order to participate to the tender that are published online. The project is international and the main objectives are reduction on the goods purchased and the creation of the company identity "try to apply rules standard for all the countries".

Downstream. The presence of the standard Edi is required by the big international wholesaler to support the order-invoice-payment cycle. In addition OTB is exchanging with the big departments store that have accepted the proposal to exchange data about the availability of stock and at the same time the sales report. In this way Otb can give particular proposal for the replenishment. OTB is implementing also a new project called "CM –b2b" that consists in a database and a data model for the logic and commercial flow of the order. In addiction by exploiting the technique of the service design for b2c , they are building a portal shared with customers and seller for the exchange of information and multimedia file. An additional functionality can be the introduction of a catalogue for the purchase, selection and management of the order. OTB has developed the website relying on third party in line with the digital strategy of the company. The company is providing structured data that contains information about the product feature to enrich the website of content.

Document management system. As for the digitalization of internal processes they created a system from 2011, for the active and passive cycle controlled by the center of administrative service for the Italian and European company (except for Greece). The active invoice if they are exchange intercompany are automatically inserted in the system. As for the passive invoices they are originated externally, a bar code is placed on the invoice (that is the number of identification of the document), they are scanned and then inserted in the system.

Benefits and criticalities. The main important benefit of the project implemented is trying to create cohesion in the supply chain thanks to reconfiguration of processes, more visibility and transparency over data. The main objective is trying to outline not only the b2c customer but also gather information form b2b customer. Additional benefit that can be reached in the future is the use of "Cm – b2b " as way create a support channel to the sales. The new project is involving small customers but also big customer, of course when the company is dealing with great international wholesaler, it will find difficult to impose its own standard.

Parah Spa

Parah is an Italian brand leader in the production of underwear and beach wear born in 1950. The quality of the product is guarantee by the fact that the entire process of production is realized in Italy, brand values are style and high quality.

COMPANY	**PARAH SPA**
Address	Corso Leonardo Da Vinci 50
Company Web address	www.parah.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	14 mln €
Number of Employees	100
Position in the Supply Chain	Producer
Suppliers	External Labor Suppliers, Raw material supplier, Logistic provider
Customers	multi-brand, Department- store ,Owned shop Franchising, E-commerce
Interview date	10/04/17

Supply Chain Structure

The majority of the production is conducted internally, the model of the product is realized by software on the computer. There are tables where the cut is conducted. The number of supplier is around ten and they outsource only the production of accessories and the packaging part to small Labour Suppliers. The final part of the supply chain is characterized by different channel multi-brand store, big international departments store, owned shop, franchising shop and an e-commerce channel that accounts for the 3% of the total revenues.

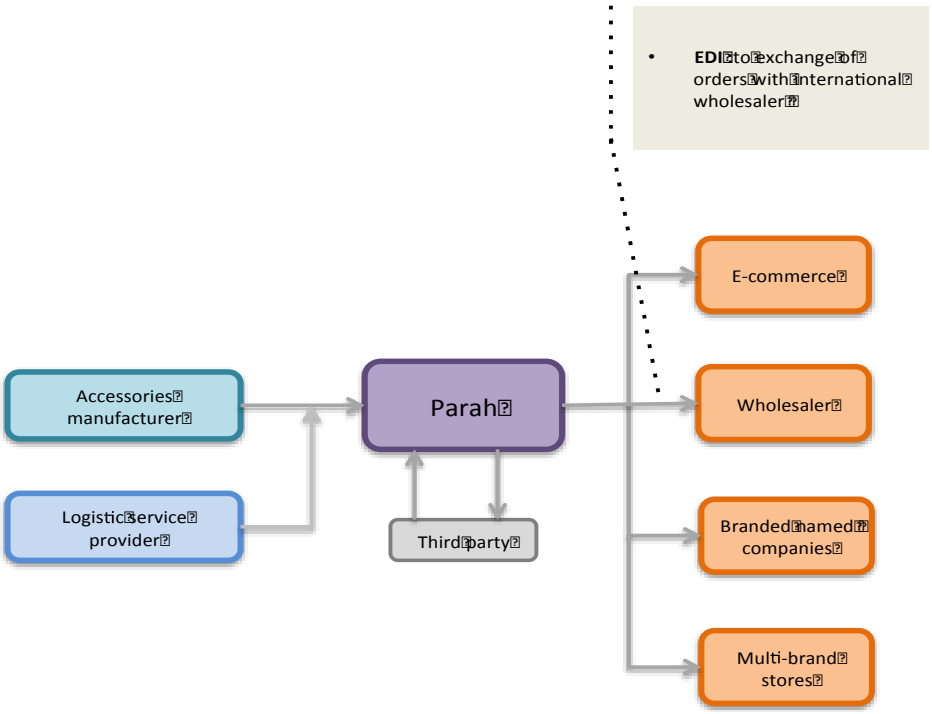


Figure 88 - Parah Supply Chain.

Digitalization Projects

Upstream. Parah is relying on a network of small supplier very fragmented and not structured. The company also maintain a supplier base very flexible in accordance to the need of feature of the product that must be realized to the request of the final customer. The majority of the Labour Suppliers are located in proximity to the company that's why the exchanges of the model and the commission is realized manually.

Downstream. The majority of digitalization project are realized with the big department store and consist in the adoption of the standard Edi to exchange price-catalogue and sales reports. The sharing of sales report help the company to understand the success products, however this information doesn't have a direct impact of the production planning because of the high lead time of 90 days, it is not possible to reintroduce the success product in production.

Digital management system. The company is adopting a data-management system to archive all the documents, the invoices on paper are scan and inserted in the system.

Transportation system. A web platform integrated with the main logistic service provider allows to maintain under control the flow of deliveries and the transportation documents.

Pompea Spa

Pompea S.p.A. manufactures and markets hosiery and underwear products for women, men, and children. The company offers bras, bottom parts, vests and knitwear, pyjamas, night dresses, tights, hold ups, knee high products, socks and shoe liners, leggings, pantacollants, panties, and shorts for women. It also provides bottoms, T-shirts and undershirts, pyjamas, long socks, short socks, socks, and shoe liners for men. The company provides its products through large-scale retail outlets, wholesalers, sales agents and representatives, retailers, and its mobile-shops and outlets in Europe and internationally. Pompea S.p.A. was founded in 1996 and is based in Medole, Italy. It has production facilities in Medole and Asola, Italy; and Brus and Zrenjanin, Serbia.

COMPANY	**POMPEA SPA**
Address	Via S. Damaso 10 Medole, MN 46046 Italy
Company Web address	www.pompea.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Textile & Textile Products
Turnover	72 mln €
Number of Employees	456
Position in the Supply Chain	Producer and seller
Suppliers	Yarn producers, Product suppliers, Packaging suppliers
Customers	Retailers, Large organized retailers, Wholesalers, E-commerce
Interview date	3rd of april, 2017

Supply Chain Structure

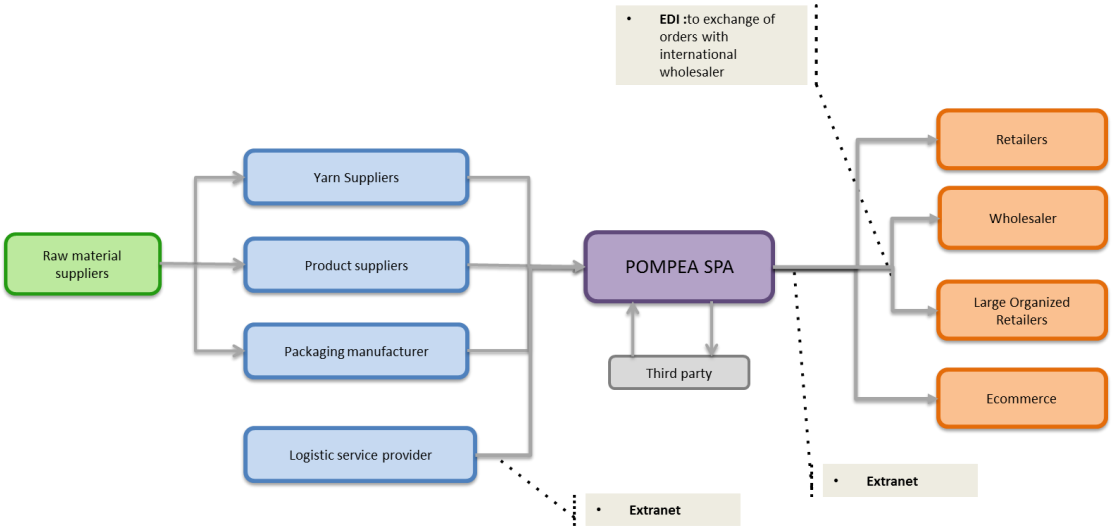


Figure 89 - Pompea Supply Chain

Digitalization Projects

Upstream. Pompea is dealing with a set of traditional and new suppliers. There are three types of suppliers: yarn producers, packaging and product suppliers. Pompea decides the quantity to order for each season (two times in a year) basing on the production capacity of suppliers and the sales forecasted calculated through So99+. In the product suppliers case, Pompea sends technical requirement, drawing and information about the order through email or with personal contact. There are no execution or collaboration projects, due to high cost and absence of digital culture. If focusing on the upstream relations, especially on the relationship with logistic providers, Pompea has recently activated a project to exchange shipping information in a digitally structured way. With some of these players, Pompea is digitally exchanging information like: delivery address, number of products, codes of the products, date of delivery and delivery confirmation proves.

Downstream. Pompea uses EDI for the large scale distribution like Auchean, SMA, Conad, Coop. They imposed the need of this technology to exchange digitally structured flows of information, like purchasing orders, invoices, and sometimes also Dispatch Advice. The challenge is that each customer uses different standards, so Pompea must personalize EDI

according to the customers' needs. Even if this channel allows Pompea to drastically reduce the volume of manual data entry, the company does not appreciate the level of inflexibility brought by this solution where also changes in shipment location require huge efforts to be implemented. Pompea is not dealing with all its downstream partners in the same way; with some wholesaler and with some player from large scale retail distribution Pompea has in place project that allows to electronically exchange documents and that manages information flows in a way that those flows can be directly read by companies' systems. Main characteristic of this solution is the possibility of sharing structured flow of data directly readable by companies' applicative systems.

Document management system (DMS) and Digital Archiving. For what concerns the internal processes, Pompea has already in place different projects aiming at increasing the documents' management efficiency. Since 2010, to reduce costs for archiving documents and to make the documents fruition easier, Pompea is digitally preserving documents related to active and passive cycle, Delivery note, employees' journals and accounting ledgers. This project is based on two external partners: one responsible of archiving the documents and one responsible of scanning the paper documents received by Pompea. Focusing on paper invoices, those are scanned by using an intelligent data capturing system to recognize and automatically extract main data in the documents. By using such a system, it is possible to automatically have in the systems a pre-registration of documents and a consequent reduction of manual data entry activity.

Benefits and criticalities. By using EDI connections, the company obtained double benefits; from one side Pompea could create relationships with its main clients, and from the other this solution allowed it to reduce risks of non-conformity. Another benefits came from the digital preservation process which allows Pompea and other interested actors to easily consult documents. Moreover, the previous mentioned projects allowed for higher precision in fiscal and financial documents as well as for a reduction of time and money spent for physical archiving; the time saved was than relocated to more value adding activities and this has increased company's efficiency Supply Chain Collaboration is made difficult by the lack of automation culture, mixed with the long time necessary to re-pay the investment given the low volume of exchanged documents and by the strong familiar business nature of the hosiery industry. Long time required to repay investments, together with margins shrinking make digital solution more a dream than a reality for companies of the hosiery industry.

Tessilform Spa

"Patrizia Pepe" brand was born in 1993 because of the match of ideas between Patrizia Bambi (creative director) an Claudio Orrea (CEO). Nowadays Patrizia Pepe is the symbol of the modern woman dynamic and smart, a brand that has successfully combined everyday dressing with the elegance of special moments, thanks to the use of sophisticated minimal forms and scrupulous attention to detail.

COMPANY	**TESSILFORM SPA**
Address	Via Piero Gobetti 7, 50013 Campi Bisenzio (FI)
Company Web address	https://www.patriziapepe.com/it/it
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear & Acc Design
Turnover	130 mln€
Number of Employees	250
Position in the Supply Chain	Producer
Suppliers	External Labor Suppliers, Raw material supplier, Service suppliers
Customers	Retailers (50000), Wholesalers (2500), E-commerce
Interview date	3rd of April 2017

Supply Chain Structure

Tessilform SPA can be classified as a manufacturer but it relies on a network of raw material and accessories suppliers and small artisans that are taking care only of specific part of the production process, as a whole they are about 100. Downstream is connected with the final customer by wholesalers that are around 2000 and retailers 50000. The main hubs are located in Italy in the area of Prato and Florence.

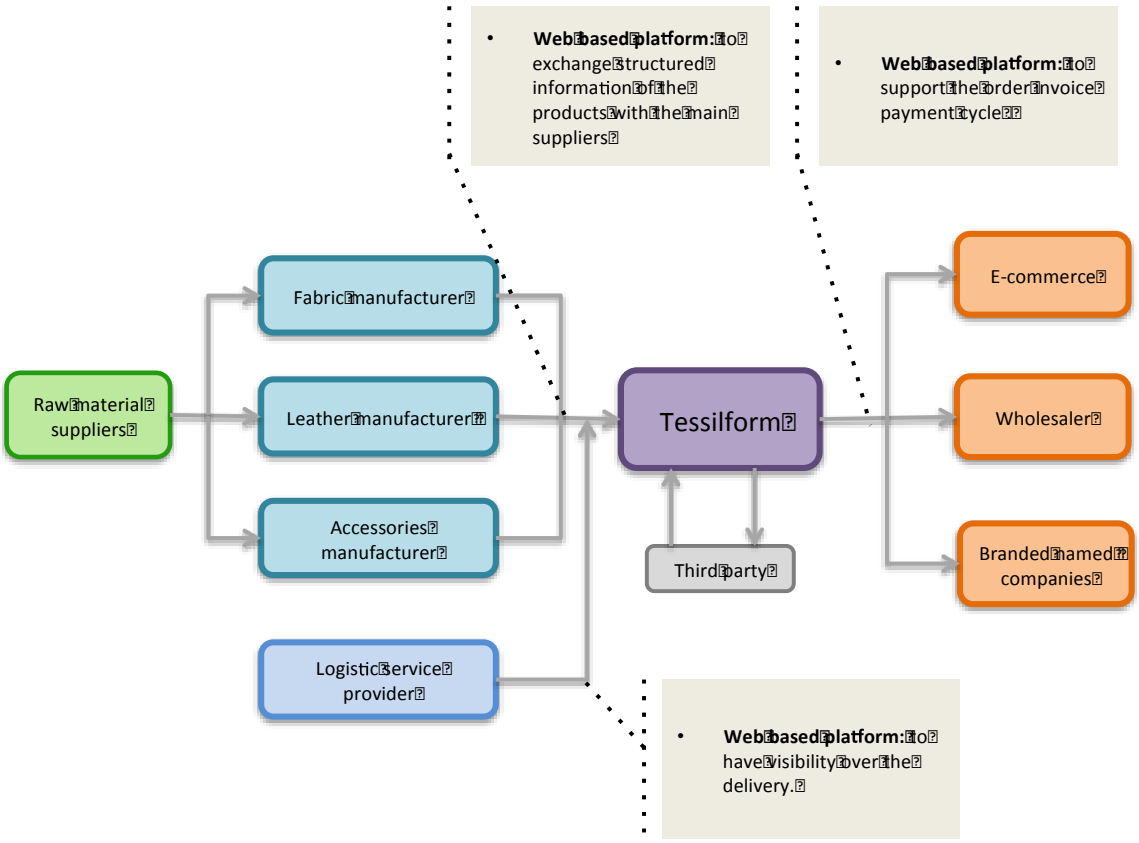


Figure 90 - Tessilform Supply Chain.

Digitalization projects

Upstream. There are two web portals were the suppliers and the company can exchange structured information about the product. In the first one the supplier can log –in and visualize the specific tasks assigned and the specific features of the output that must realize. Actually, by the portal is not possible to monitor the advancement of the production. The second one is used for the quality control, a team from the company goes to the supplier signing the result on a device that is connected to a portal to schedule the performance of suppliers and establish a ranking.

Downstream. There are two web portal ne for the wholesaler and the other one for the retailers in order to communicate the availability of the goods. Inside the portal with the retailers some procedures of automatic replenishment are being introduced, thanks to the availability of data about the sales.

Digital Transport system. The transportation documents at the beginning were entirely digitalized and stored in the system, but because of the problem with the custom duties now some of the goods are travelling with the paper document. The company is relying on LSP, there is a portal that connect the logistic service provider, the company and the retailer in order to track the products and have all the information about the delivery.

Future development. The company is planning to enforce the relationships with the wholesaler and retailers in order to get more information and having a better forecast accuracy that will be the starting point for the production planning.

Benefits and criticalities. The exchange of the information between the suppliers and the company has allowed to simply the activities inside the main warehouses, that in the past had to introduce content on the tag of the clothes. In this way the hub can refocus on the core activities. The company wanted to introduce and e-procurement Portal, but because of the fragmentation of the sector wasn't possible to classify the suppliers.

Twinset

Twinset is placed on the affordable luxury segment of the women's apparel market. The target customers are women between 35-45 years old, but there are product lines also for young girls. The product line wants to offer a "total look" and an affordable luxury wardrobe, for any occasion and for any time of the day. TWINSET has its headquarters in Carpi (Modena) and, with about 900 employees, is one of the fastest growing women's clothing companies. The collections are distributed through 78 boutiques and outlets, franchise stores, corners, wholesale distribution channels in Italy, Europe, Russia and Middle East and a dedicated Online sales website.

COMPANY	**TWIN SET**
Address	Viale del commercio 32, 41012 Carpi
Company Web address	http://www.twinset.com
Business Sector	Consumer Discretionary
Industry	Apparel & Textile Products
Sub industry	Clothing
Turnover	240 mln€
Number of Employees	850
Position in the Supply Chain	Producer
Suppliers	External Labor Suppliers, Raw material supplier,Service suppliers
Customers	Owned shop (80), Franchising (40), Wholesalers (2500), E-commerce
Interview date	31st of March 2017

Supply Chain Structure

Twinset can be classified as a manufacturer, they have a small weaving mill that is mostly used for research activities, collection of samples and small production. The majority of the production is associated to third party, twinset gives the supplier the technical requirements according to the specific part of the process of production, or they buy directly the finished product. The control of the raw material for the supplier is executed only for the small Italian

Labor Suppliers, on the contrary the producers of the final product can have the control over the second tier of the supply chain. For what concern the distribution channel Twinset is relying on a network of 80 owned shop that help the customer experience the values of the brand, franchising shops and a great number of wholesaler and finally the ecommerce channel.

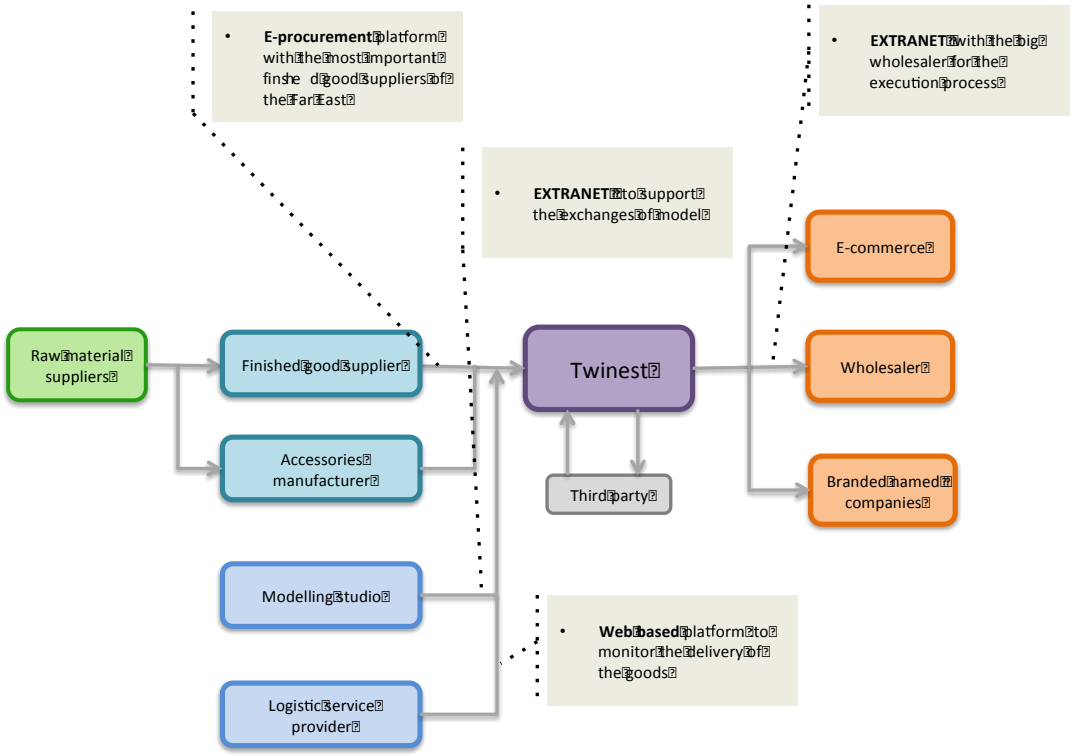


Figure 91 - Twinset Supply Chain.

Digitalization projects

Upstream. Twinset is relying on two main web platforms to connect with the network of suppliers. On important portal is the one between Twinset and the modelling offices. This portal is used by Twinset to support the collaboration process: on the one hand they upload the technical data sheet for the supplier , and on the other hand the supplier can log in, develop the model of the product, release information about the advancement of the production. The other important platform is the E-procurement between Twinset and the big producers of the Far East , that are already structured to support these processes because they are also connected with the big international fashion houses. The number of these suppliers is fixed, because they represent the most important. On the e-procurement portal the order is placed and the supplier has to

confirm the order, has to show the delivery date and the production modality. Additional functionalities of the e-procurement portal are the possibility to see the result of the quality control check and the presence of records about the supplier base with the pricing list of the item.

Downstream. They are connected with big wholesalers but they don't use EDI, because the huge investment is not supported by the volume of the sales.

Digital Transport Documents. The suppliers can upload on the e-procurement platform the invoice, and the logistic provider will not request the document again. The logistic service provider logging in the platform can check when Twinset has authorized the emission of the invoice and the packing list and then it starts creating the document of transport that will contain: indication about the mean of transport, the time of the undertaking of the goods and the time of the expected delivery. The case is more complex for the foreign supplier of the Middle East where the documents are travelling with the goods because of the custom duty.

Future Projects. The objective for the company is to extend the E-procurement platform the entire supply base, also with small Italian suppliers even if the process will be complex because they are fragmented entities.

Brief Analysis of the interviews

The aim of this section is to sum up the main important information that emerged from the analysis in order to get more insights to support the creation of the model. The number of the interviews were 21, with different actors: 19 manufacturers in particular 17 Fashion Houses and 2 yarn producers (Clerici Tessuto and Ermenegildo Zegna) and 2 big retailers such as : La Rinascente and Intersport. The aim was to have a broad overview of the Fashion sector and at the same time trying to get more details about the specific processes. The majority of the interviews were conducted with medium/ companies but also great Italian brand were included.

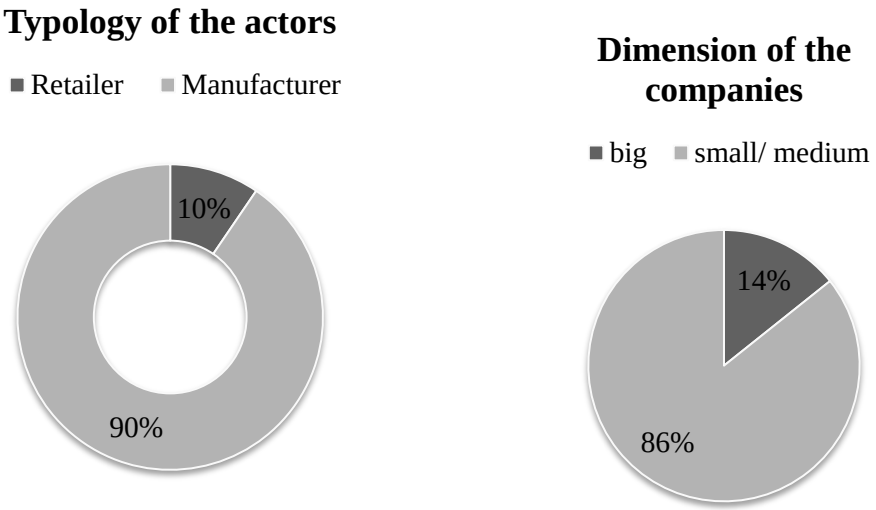


Figure 92 – Characteristics of the Sample in Analysis.

One of the main objective of the link with the companies was trying to understand how they were connected with their own network of suppliers. At first we have distinguished between the main manufacturers and the retailer. ***Figure 69*** is a recap of the results obtained by the interviews, in particular the focus is among the manufacturers and their interconnection with the different typology of suppliers: raw materials, third party and finished products of suppliers. the company are spread according to the specific digital tool adopted in the particular relationship with the main suppliers. what is clear is that, in the Fashion sector despite the other sectors the use of the Edi standard is limited considering the fragmentation of the suppliers. The solution that is more diffused is the use of the web portal of extranet that offers on one hand flexibility and on the other hand the possibility to introduce different functionalities. Another factors that

brings lots of attention is the use of email and phone calls to support the order invoice cycle that are very simple instruments.

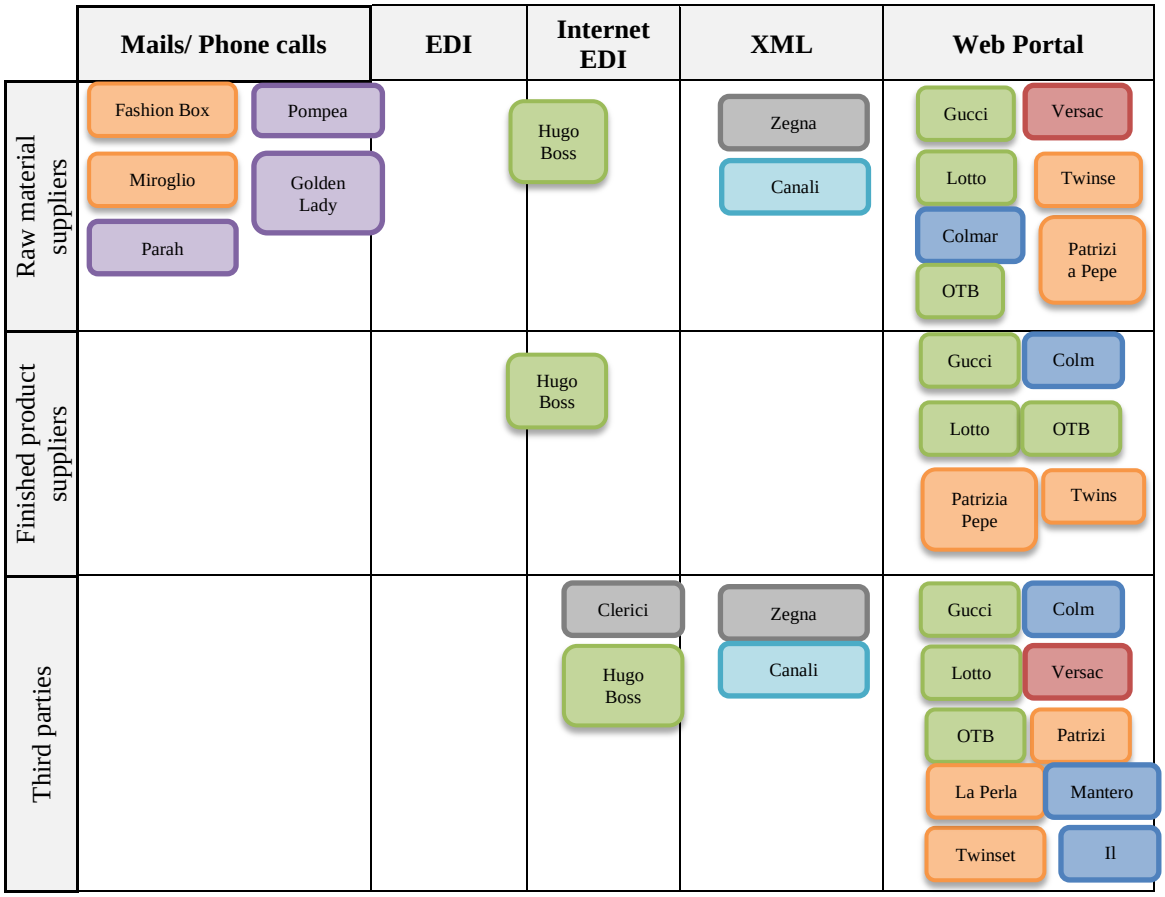


Figure 93 – Distribution of the companies according tto the digital tools used for the relationship with each actors.

In ***Figure 90,*** is showed the analysis on the processes that are covered by digital tools among the Fashion House and their suppliers. The research has showed that despite the need to introduce different and creative products in the market, the advantages of the collaborative procedures like the joint development with the suppliers of the new products is something not completely exploited in the fashion sector or only few companies are just adopting him. A good example of the case can be the platform introduced by Lotto with the foreign suppliers for the exchanged of the drawings of the products and receiving feedbacks and giving the permit to the suppliers to modify them. another example of innovative solution is a Web based platform, by which Gucci logistic can share data and information like timetables, the work progresses expectations, distinct basic, technical information (CAD drawings or product templates) with

the leather manufacturer suppliers. Gucci Logistic is also able to control the production progress considering the Macro-activities, for example Cutting – assembly– packaging, and this is very important for Gucci to assign future orders to suppliers. The majority of the processes that are automated are the once that cover the order- invoice payment cycle: pre-order emission, order emission and the administrative cycle with all the invoices. What is being introduced by the Fashion houses are procedures in order to have an increase of the control over the supply chain, system to monitor the production advancement and the level of stocks inside the main warehouses in accordance to the need of optimizing the processes and obtaining cost advantages.

	Execution					**Collaboration**			
	Pre-sales support	**Order emission**	**Logistics**	**Administrative cycle**	**Post-sales support**	**Monitoring and control over the supply chain**	**Collaborative management of planning activities**	**management of the development of**	**Co-marketing**
Canali	❖	❖		❖					
Clerici	❖	❖		❖					
Zegna	❖	❖	❖	❖	❖	❖	❖		
Fashion Box	❖	❖							
Versace	❖	❖	❖	❖	❖	❖			
Golden Lady	❖	❖							
Gucci	❖	❖	❖	❖	❖	❖	❖	❖	
Hugo Boss	❖	❖	❖	❖	❖	❖	❖	❖	
Il Gufo	❖	❖	❖	❖		❖			
La Perla	❖	❖	❖	❖		❖			

Lotto	❖	❖	❖	❖	❖	❖	❖	❖	
Colmar	❖	❖	❖	❖					
Mantero	❖	❖	❖			❖			
Miroglio	❖	❖	❖	❖					
OTB	❖	❖	❖	❖	❖	❖			
Parah	❖	❖	❖						
Patrizia Pepe	❖	❖	❖	❖	❖				
Pompea	❖	❖	❖	❖	❖				
Twinset	❖	❖	❖	❖	❖	❖	❖	❖	

Figure 94 – Focus over the processes supported by Technologies.

The analysis follows the downstream side of the supply chain and in particular the main ways in which the Fashion House interacts with the wholesaler and the group of owned shops. Despite the upstream case, the Edi is more adopted especially in the case of the big international wholesaler, where the adoption of Edi standard is compulsory. The web platform is the solution more adopted to control the network of owned shops for sake of simplicity and for the possibility to add further functionalities to the platform to connect with the innovative technology of RFID in order to monitor the items.

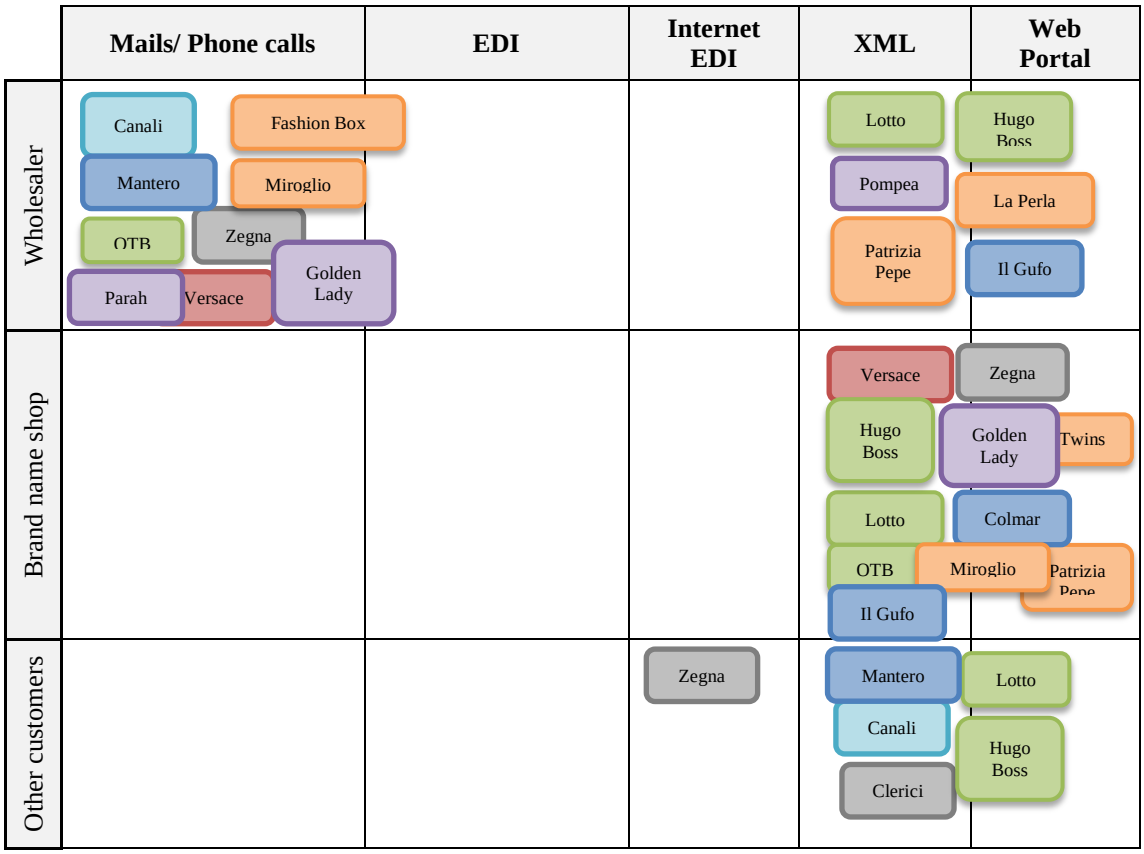


Figure 95 - Downstream connection_ FASHION HOUSE.

Finally it is also interesting to investigate the main solution adopted by the big retailers to interconnect with the main suppliers. Both La Rinascente and Intersport are adopting Edi standard. With some of the biggest producers (Adidas and Nike) Intersport has in place an EDI channel to exchange flow of data with them. The channel is used by suppliers to send invoices and by Intersport to send orders to Cisalfa's shops and to the other affiliates during selling

periods. EDI channels are used from suppliers to send digital transports documents which allows the company to directly charge the received goods inside its systems avoiding manual control. Intersport centralized the management of good using an existing Intersport warehouse. The new solution allows all the affiliates to send, in digital format through the already existing web portals, all their orders which will be collected by Intersport. It makes the relationship between the suppliers easier because of a better structured and organized process. La Rinascente exchanges electronically the daily sales reports data, which are made available to all suppliers in EDI. Exchange of this type of data represents a form of collaboration, that goes beyond the simple transmission of the documents of the cycle order via EDI: Data to sell, broken down by code, date and point of sale are in fact very important for suppliers because they allow them to have a overview of daily sales and visibility on market demands. La Rinascente implements a project for all the suppliers with a Confession-relationship selling in the Duomo Department Shop to eliminate traffic around the department store during the replenishment. This project enhances a small collaboration between the parties. On one side it helps La Rinascente managing the traffic that all the Brand carries would have generated around the Departement Store and on the other side also Brand Companies received a zero cost service, reduction of wasting time with high visibility on the tracking and security issue.

	Mails/ Phone calls	**EDI**	**Internet EDI**	**XML**	**Web Portal**
Fashion House		Intersport La Rinascente			
Others					Intersport

Figure 96 - Upstream connection_RETAILER.

6. INTERPRETATION AND VALIDATION

6.1 Insights from the observation

In accordance with the empirical evidence that emerged, the researchers have been allowed to build a model to suggest the correct digital tool, supporting the communication between the business partners, in accordance with the features of the relationships and the enclosed level of risk. The empirical evidence, further supported by the literature analysis, suggests two main findings:

- The stronger the relationship, the advanced are the tools to support the exchanges. The relationships is based on the previously mentioned factors, such as trust and long term objective. These factors lead to the possibility of the two parties to both agree an good effort in investment or organization changes to support new collaborative processes due to the introduction of the digital tool.
- The higher the Supply Risk, the higher the need for Fashion Houses to increase the level of visibility over the supply chain. In particular, the latter objective is realized by the application of the collaborative practices such as production planning, joint forecasting activities, inventory control and the quality registration, ***See Section 2.***

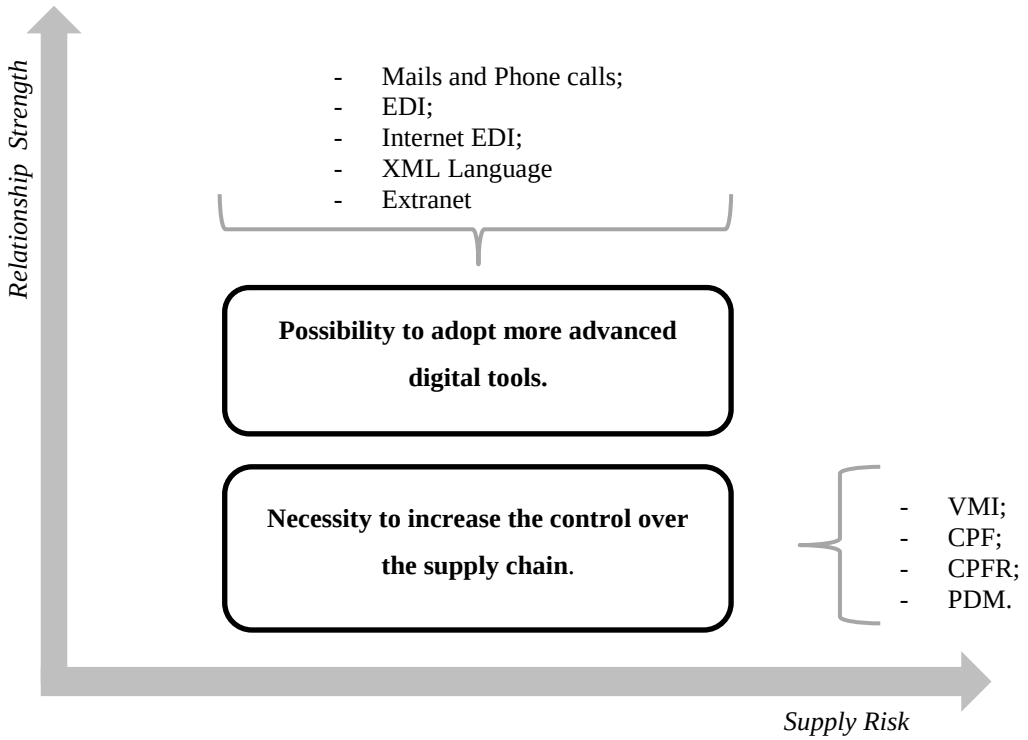


Figure 97 - Brief representation of the Solution.

Considering the empirical evidence, the concentration of the companies reveals the presence of 4 main clusters. However, the number of Fashion Houses are still limited and probably further interviews would have allowed the creation of other interesting clusters. *In accordance to it, it is important to consider other shades of the relationship* between the Fashion House and the main suppliers and to investigate on the solution adopted. For this reason, the framework is deeply subdivided into 9 areas of interest. In this way, companies with different characteristics and peculiarities can be more detailed studies. The lack of empirical evidence in some areas is due to the strange situation, sometimes critical, that determines it, and as consequence, the low population in the sector. Finally the main aim is to provide good explanation to all the different situations considering the assumption at the base of the models: a further increase in the Supply Risk determines the need of a wider control over the network; while a further increase in the Relationship Strength determines an adoption of advanced tools to support transactional and collaborative processes.

6.2 Definition of the Solutions

Given the insights found in the empirical research and the deep literature analysis, the result is resumed in the following framework:

Strength of Relationship			
	A3	**B3**	**C3**
	A2	**B2**	**C2**
	A1	**B1**	**C1**
	Relationship Risk		

Figure 98 - Solution Resume.

The 9 areas, according to the Supply Risk and Relationship Strength level, are characterized by the following collaboration processes and digital tools:

A1) Low level of Supply Risk and low level of Relationship Strength. In this cluster, Fashion House relies on vertical integration or on a network of suppliers that don't execute core tasks. In order to develop the activities in outsourcing, there are not difficulties in finding the suppliers. For this reason, companies prefer to not build long term relationships but only occasional transactions when needed. The Relationship uncertainty creates obstacles in creating a better structured system supporting the basic processes, such as the order-invoices payment cycle. For this reason, it is mostly realized by phone calls or emails.

A2) Low level of Supply Risk and medium level of Relationship Strength. In this cluster there are companies, relying on few suppliers. They have low expertize and simple task assigned (low level of risk), for this reason they are easy to switch. However the supplier based is quite fixed and the supplier could be located near the Fashion Houses. In this context, it could be better to start exchanging a more structured form of information, allowing the simplification of the transactions and the storability of the data. This objective cloud be realized through shared file in a cloud system and internet networks.

A3) Low level of Supply Risk and high level of Relationship Strength. Companies rely on a network of suppliers that could be located near the area of interest; they could be quite fixed and with strong agreements. The environment of the relationship is featured by high level of trust and shared goals. The needs of simply the connection with these entities provides a good reason to adopt more sophisticated form of structured information, like XML standard. It is simple and easy to be learned by the small entities and can be customized according to the specific needs.

B1) Medium level of Supply Risk and low level of Relationship Strength. In this cluster all the Fashion Houses, that relies on a wider network of suppliers, are included. The main reason is the necessity to maintain flexibility in the supply chain and to select the proper supplier that best answer to product and collection features. The low level of Relationship Strength creates obstacles to the Sharing-data process, such as technical requirements. The complexity in the Supply Risk could be caused by the increase of the suppliers' number or the spreading worldwide. For this reason, there is the necessity to control the advancement of the production in order prevent delays. The suppliers can realize the outcome requested selecting their preferred way, but being compliant with the standard of quality requested by the company. They

could exchange technical requirement by mails or cloud services. The relationship weaknesses and volatility prevent to support the process with more advanced tools.

B2) Medium level of Supply Risk and medium level of Relationship Strength. In this cluster there are present all the Fashion Houses, that rely on suppliers for the realization of important production parts or other activities, increasing the level of risk. The environment, characterized by medium trust and good interaction with the suppliers, allows the possibility to exchange simple technical requirements, drawing and exclusive models through a web portal. The web portal could be mainly structured in order to support the order payment cycle and to register the advancement of the production.

B3) Medium level of Supply Risk and high level of Relationship Strength. The high Relationship Strength allows the two parties to increase the level of integration with the introduction of more advanced digital tools, that enables more frequent interactions. It requires huge investments; for this reason, it should be performed with the more structured and reliable supplier, that can support the realization of the projects of introduction of Edi or Internet EDI. The technology can cover activities like the order cycle process, the advancement of the production, the level of inventory and the exchanges of technical requirements.

C1) High level of Supply Risk and low level of Relationship Strength. The high Risk Level could be associated to those companies that realize core activities or important part of the production, and rely on Worldwide suppliers. The simple exchange of mails and phone calls should be overcome with the introduction of more flexible tools, such as cloud platforms. Suppliers should let the Fashion House monitoring and controlling the advancement of the commission and quality of the processes.

C2) High level of Supply Risk and medium level of Relationship Strength. The Supply Risk is high due to the wide and international supplier's base. However the suppliers chosen are quite fixed, it allows the increase of integration and the exchanges of more reserved data, such as the level of inventory, the advancement of production. The suppliers can provide indication about the capacity level in order to avoid bottlenecks, that can create problems to the entire supply chain.

C3) High level of Supply Risk and high level of Relationship Strength. In this part the Suppliers could be international or with high Numerosity. They perform important tasks or components for the final product, for example the Fashion House wants to exploit the innovative capabilities

of the supplier, in the realization of the collection. For this reason, the introduction of a web platform with different functionalities could be strategic to create an environment that allows the exchange of feedbacks and sharing ideas. Fashion House should need to integrate and collaborate with the suppliers also over the production phases: monitoring the production process, performing the automatic allocation of the commissions on the base of the availability of the suppliers , having visibility over the stock level, sharing quality control data at the end of the production process. In this area, both of the partners developed good experience in the relationship and , for this reason, they jointly operate for the sake of the correct flows of goods inside the supply chain.

The table below summarizes the best digital tool supporting the relationship Fashion Houses - Labor Suppliers:

Strength of the relationships			
	Development of a specific standard and procedures to use with the stabilized suppliers' base. The strength of the relation leads to the realization of a specific language XML to use in the application.	Use of EDI system and more structured web based portal. Necessity to coordinate the execution activities: order cycle but also production processes, and level of inventory. The system can also allow communication the progress status of manufacturing	Web platform integrated with the internal ERP : -to control the advancement of the production; -allocation of the capacity; -Joint product development; -Joint forecast -Joint production planning;
	The communication are based on simple system of communication but with an information more structured thanks to the increase in the strength of the relation.	Web portal with very basic functions: - such as the allocation of the order; -the exchanges of models and drawings;	Web portal with additional functions to register : -Advancement of the production; -Level of inventories; -Quality controls data;
	The main ways of communication are very simple such as : -Mail -Phone calls The activities that are controlled are execution activities.	The main ways of communication are very simple such as : -Mail -Phone calls Necessity to increase the control the suppliers process by registering milestones of advancement of the production.	The main ways of communication are very simple such as : -Mail -Phone calls Necessity to increase the control the suppliers process by advancement of the production, quality standard of the processes.
Level of risk			

Figure 99 - Solution Output.

In each area the best digital tools are identified, but not all the area represent the best environment for companies. For these reason, investment in enforcement of the relationship or the decreasing of the Relationship Risk could enable companies to move from one area to another one. Of course, before making final assumption and conclusions it is important to evaluate the peculiarities and characteristics of the company. For simplicity of analysis, the following paragraph describes two important cases, called “Green Area”, “Yellow area” and “Blue area”, considering a standard Fashion Houses.

Green area. They could be considered as optimal quarters, thanks to the good balance between Relationship Strength and the Relationship Risk. For example, in A1 the technologies used are very simple and dated. However the Relationship Strenght with suppliers is very weak and also the Supply Risk is very low. In A1, B2 and C3, there is coherence between the digital supporting tool and the need of control and relationship enhancement

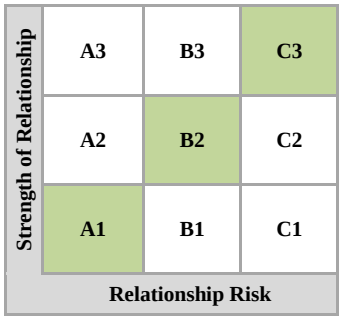


Figure 100 - Green Zone Focus.

Yellow area. C1, B1 and C2 are critical areas, because of the complexity of the network of suppliers, and the low Relationship Strength with them. Indeed not in all the situation, it is possible to adopt digital tools that could control the risk, without a good the Relationship Strength: for example, there could be suppliers that do not wants to collaborate. The suggestion, in this cases and when it is possible, is to increase the level of Relationship Strength or to decrease the level of Relationship Risk, for example with a rationalization or changing the supplier base.

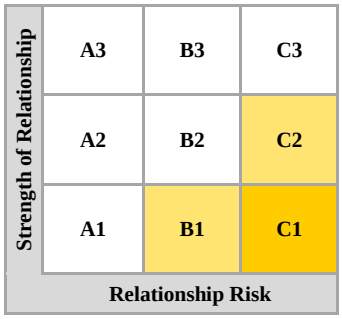


Figure 101 - Red Zone Focus_1

Blue area. Also this area should be taken under attention. Companies make investments in Relationship Strength with a level of Supply Risk. In some cases, It could represent a waste of resources, money and time. However, there are companies, like the luxury ones, that needs high quality standard and gaining high margin, they can afford such investments. A

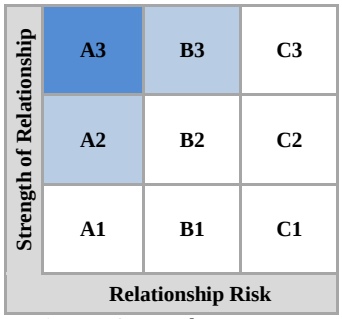


Figure 102 - Red Zone Focus_2

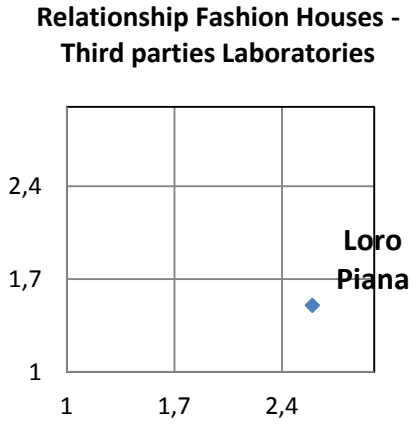
suggestion could be to integrate vertically.

6.3 Case Studies

The objective of this section is to validate the model through three Case Studies: Loro Piana, Dolce &Gabbana and Moncler, S***ee Appendix VI.*** The analysis are based on interviewees to their managers, that represents the main experts in the field. They have been fundamental to position correctly the companies interviewed in the matrix. After that, the coherence of the actual position of the company with the model developed is confirmed, considering also the future perspective of the company.

Loro Piana Case

Loro Piana is characterized by two main divisions: Luxury division, that is in charge for the production of clothing item, and the Textile division, that is in charge for the production of the main fabrics. The level of vertical integration in Loro Piana Group is quite high: Textile division provides many inputs to the Luxury division, basically fabrics to start the production of the clothes. The supply base seems to be complex: suppliers have a worldwide distribution and they execute important activities, that have great impact on the final product. For this reason, *Relationship Risk is high*. Concerning the Relationships Strengths, Loro Piana have connection with many façons, that are not fixed and changes according to collections requirements. Raw materials suppliers are instead exclusive and strongly controlled by the Company. Suppliers are not well-classified and monitored and the Company have no enough power to impose standards over the supply chain. For this reason the *Relationship Strength is low*.



Y=Relationship Strength	***Weight***	**Loro Piana**
Trust	*0,25*	1
Power	*0,25*	2
Vision	*0,25*	1
Communication	*0,25*	2
TOT	***1***	**1,5**

X = Relationship Risk		
Collection Peculiarities	*0,2*	3
Technology	*0,2*	2
Supply network	*0,2*	3
Complexity of production	*0,2*	3
Knowledge	*0,2*	2
TOT	**1**	**2,6**

Figure 103 – Loro Piana positioning

AS-IS Solution. The actual situation of the company in the matrix is immediately identifiable. Loro Piana is positioned in an area of high *Supply Risk*, due to the wide spectrum of international suppliers and the complexity of the production (the realization of products needs great craftsmanship). The *Relationship Strength* is instead low , due to the absence of a common vision with the main suppliers (the business partners and Loro Piana have a strong separation). The model shows that the main digital tools used by a company are simple exchanges of mails and phone calls. They are actually the tools ways Loro Piana communicate with, with suppliers: the entire process of sourcing, vendor selection, contract and performance management is completely uncovered by technologies.

TO BE Solution. In addiction, during the interview the future projects of the company emerged, that are: procedures standardization, centralization of the main purchasing activities to the purchasing function; improvement of the reliability of the information and supplier valuation and monitoring process. The rationalization of the suppliers base and the increase in the level of integration will enable the Company to pursue the above mentioned projects. Resuming, there are two main changes:

- Supply Risk reduction, due to the decrease of the suppliers;
- Relationship Strenght improvement, due to the "best suppliers" identification, thanks to a better suppliers' performance measurement, and the reinforcemnet of the partnership, thanks to a better exchange of structured informationa and the creation of a long term contracts.

This two changes will move the Company in another position in the matrix (***see Figure 81***). The projects of the company have a common starting point: the development of a platform, that will facilitate the relation with the main suppliers. At first, it will support the execution activities, while in the following phases, it will allow the adoption of collaborative functionalities, like joint production planning, allocation of the capacity exchanges of ideas to realize new products. It is evident that also the future solutions match with the proposed technologies of the new position.

In conclusion, Loro Piana case gives reliability to the model for the accuracy of both the actual situation – C1, considering the characteristics of AS-IS situation, and the future position of the company –B3, considering the TO-BE developments.

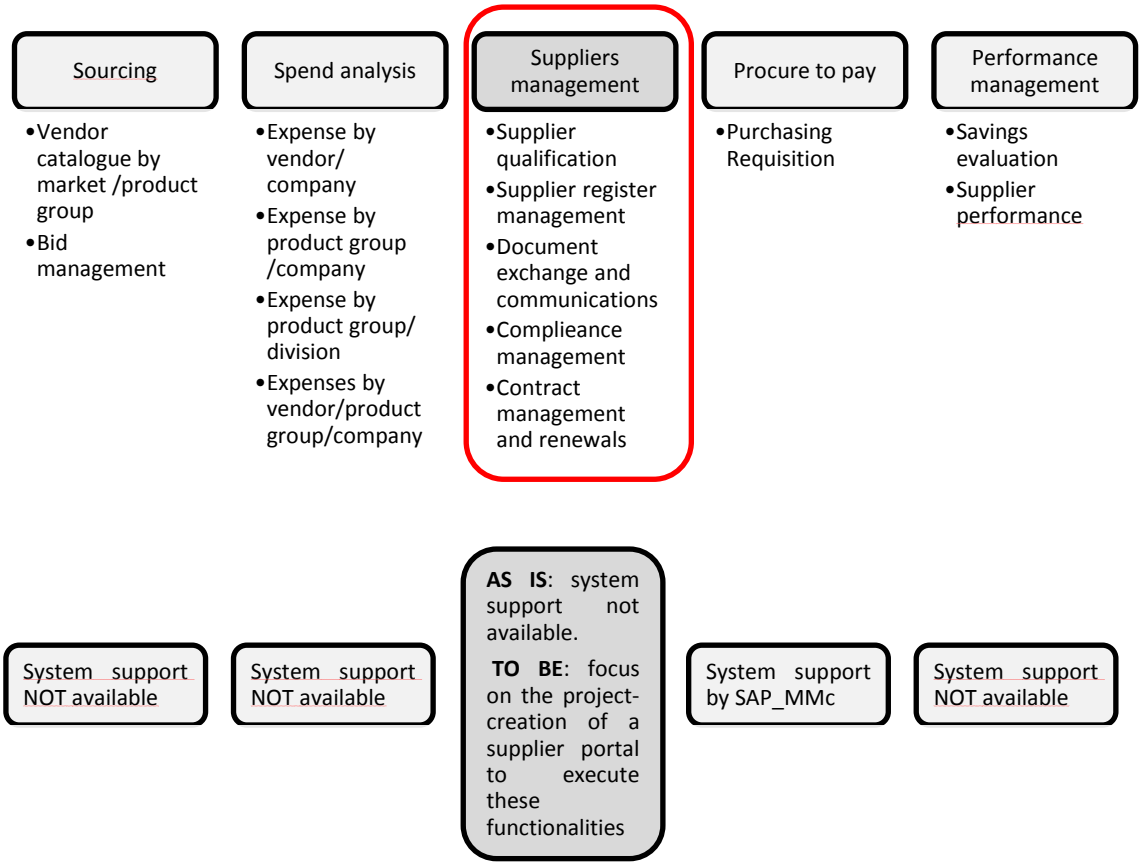


Figure 104 – Loro Piana's future Project.

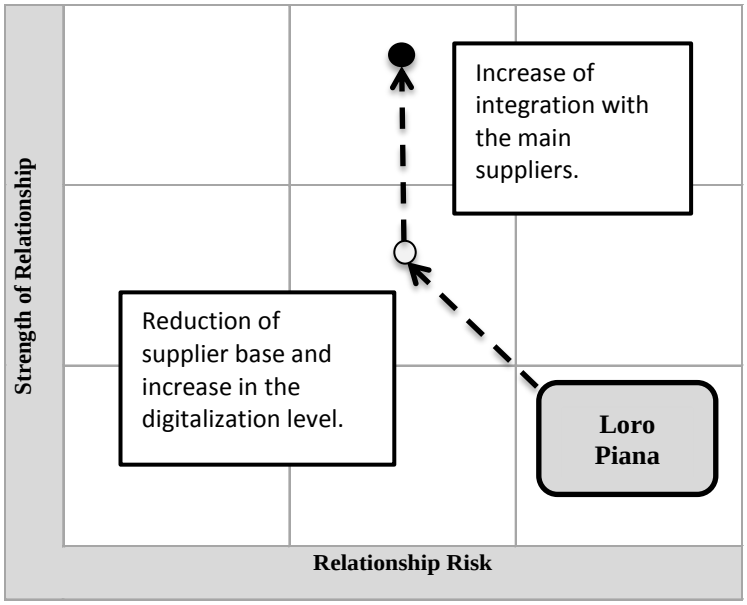
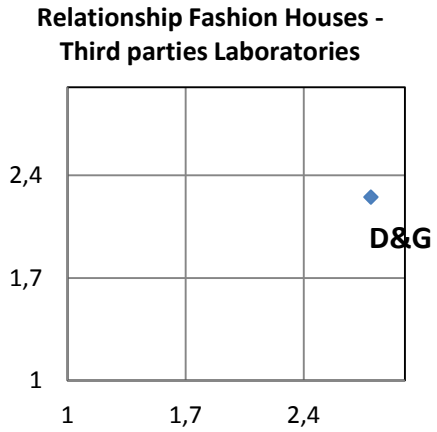


Figure 105 - Loro Piana Positioning AS IS - TO BE.

Dolce & Gabbana Case

Dolce & Gabbana is characterized by a variegated supply network and intricate collection peculiarities. D&G belongs to high luxury sector, and it has to deal with high number of labor suppliers with different capabilities, roles in the manufacturing processes. Some of the manufacturing phases needs niche knowledge and technologies to be performed as expected, (this is one of the reason why Power variable is lower than the Trust). For all these reason, the *Relationship Risk is high.* The nature of the relationship is collaborative: both the partners have active behavior in all the choices and activities. In particular, in the PLM, the necessity to share private documents and information regarding new collections requires the creation of a strong and trusted partnership with the labor suppliers. Power, Vision and Communication variables are less important than Trust, because suppliers performed small parts of the production. They have heterogeneous skills and are involved according to the collection peculiarity; for this reason, it should be very complex to communicate and share vision and goal to the whole supply base. *The strength of relationship is medium.*



Y=Relationship Strength	***Weight***	**D&G**
Trust	*0,25*	3
Power	*0,25*	2
Vision	*0,25*	2
Communication	*0,25*	2
TOT	***1***	***2,25***

X = Relationship Risk		
Collection Peculiarity	*0,2*	3
Technology	*0,2*	3
Supply Network	*0,2*	3
Complexity Of Production	*0,2*	2
Knowledge	*0,2*	3
TOT	***1***	***2,8***

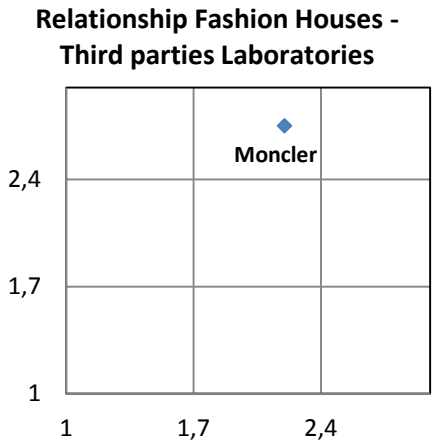
Figure 106 – Dolce & Gabbana Dataset

Due to the active role of Suppliers in the manufacturing and new product development process, D&G implemented a collaborative platform with the supplier that are continuously involved in the operations. The Company can send to the suppliers different document, regarding design, technical data, bill of material and drawings. In addition, Labor suppliers uses the portal to

download documents and give feedback on the feasibility of commissions. The platform is implemented only

Moncler Case

Moncler' suppliers are located in Europe, Italy and Asia, that are countries able to ensure high quality standards that are among the highest in the world. The products offered by Moncler are created, produced and distributed according to general operative guidelines. It directly manages the creative; purchase of raw material, and prototype development phase. The cutting and finishing phases are instead assigned to standard Labor Suppliers. For these reasons, the *Relationship Risk is medium*. In addition, Moncler is highly focused on product quality: it must comply with the highest standards in the industry and the use of fabrics, characterized by high quality and advanced functional and aesthetic features. For this reason, the company carries out direct supervision, by conducting audits to check aspects regarding product quality, brand protection and compliance with current laws and Moncler Code of Ethics. For this reason, Moncler needs to build strong relationship: the *Relationship Strength is very high*.



Y=Relationship Strength	***Weight***	**Moncler**
Trust	*0,25*	3
Power	*0,25*	2
Vision	*0,25*	3
Communication	*0,25*	3
TOT	***1***	***2,75***

X = Relationship Risk		
Collection Peculiarities	*0,2*	2
Technology	*0,2*	2
Supply Network	*0,2*	3
Complexity Of Production	*0,2*	2
Knowledge	*0,2*	2
TOT	***1***	***2,2***

Figure 107 – Moncler Dataset

The position of the Company is completely in accordance with the model. The *high Relationship Strength* suggests the need of digital tools, enhancing the speed of the communication among actors. Extranet supports the electronic exchange of the Delivery Note, facilitating the goods activities, supporting the need of quality control, which must comply with the highest standards in the industry. A *medium Relationship Risk* is sufficient to adopt Web Portal to allow communications between the Fashion House and the labor supplier. In addition, Labor suppliers can update the manufacturing progress status to maintain Moncler continuously

up-to-date concerning the evolution of activities. The active collaboration is not suitable because the Company wants to directly control the operation and production phases ,without giving any kind of freedom.

Appendix_VI

Loro Piana

Loro Piana was founded in 1924, by the engineer Pietro Loro Piana. It is an Italian company, positioned in the high luxury segment and it has got two main division. The first one is Textile division, that is in charge for the production of valuable fabric by using special raw material such as cashmere, baby cashmere, vicuna, lotus flower and extra-fine wools; the second one is the Luxury good division, that is in charge of the production of the final products (clothes and accessorize), and they are realized by the own textiles.

Company	**LORO PIANA**
Address	Corso Rolandi, 1013017 Quarona Sesia (VC) Italia
Company Web address	www.Loro Piana.com
Business Sector	Apparel & Textile Products
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	800 mln € (70% luxury division, 30% textile division)
Number of Employees	3000
Position in the Supply Chain	Textile manufacturer, finished product manufacturer;
Suppliers	Raw material, Finishing suppliers, Intermediate product supplier
Customers	Owned shop 161, wholesaler, E-commerce
Interview date	24/08/17

Supply Chain Structure

Upstream the main characteristics are:

- 1000 raw material supplier, including mainly yarns, fabrics and leather manufacturers (13,6% of expanses over the total amount of purchases). The textile division is also the supplier of the Luxury good division, and it is acquiring raw materials, such as wools and particular tissues from a Japanese supplier for the realization of technical clothes;
- Façon (22% of expenses over the total amount of the purchases);

- 200 Labour Suppliers (% of expanses over the total amount of purchases);
- Packaging suppliers to wrap accessories and clothes (100 ML).

Downstream there is a network of 161 owned shops spread worldwide in the most exclusive location there are also the wholesaler and e-commerce channels implemented.

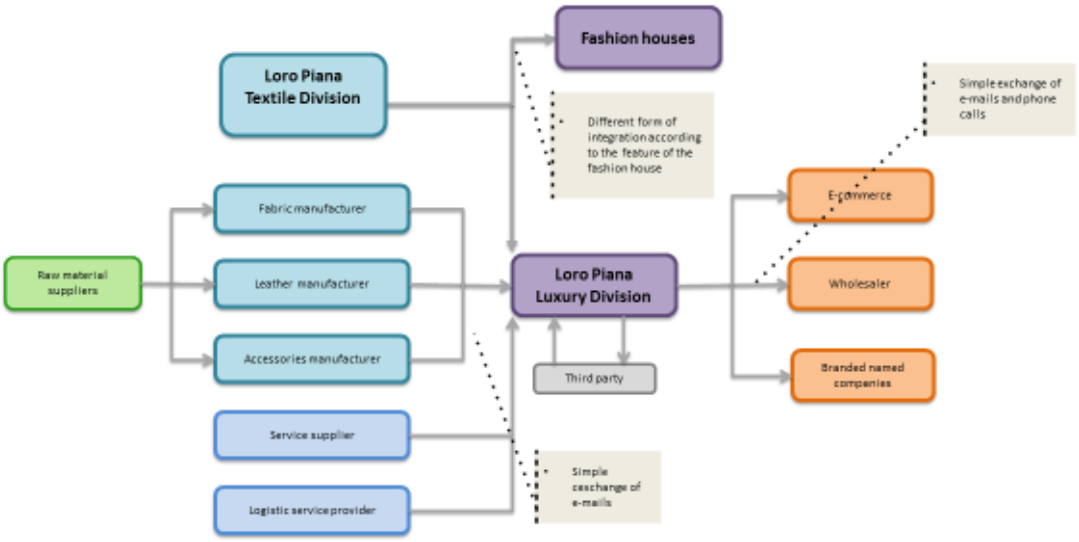


Figure 108 - Loro Piana Supply Chain.

Digitalization Projects

Upstream. The Luxury division is featured by low level of digitalization with the main suppliers: orders and the sustainability certificates of the suppliers are sent by emails. There is a clear lack of the register of the main suppliers. In contrast, in the textile division, the situation is completely different: the suppliers are better structured and use the standard format (XML), to exchange information and send information about the advancement of the production.

Downstream. Luxury division: the interaction with the owned shops, as form of orders and reorders, is managed by simple exchanges of mails, with no utilization of a web portal. Textile division: 30% of the sales is absorbed by Loro Piana Luxury division; 70% of the sales is acquired by big international Fashion Houses, that can be more or less structured. In the first case, Fashion Houses can exchange with Loro Piana Textile technical products specification and drawings by a web portal or emails.

Digital Management System and Digital Transport System. The internal level of digitalization is medium. There is electronic storage of all the main invoices, but there is a lack

of standard information among the entire Loro Piana group. The transport documents are delivered with the goods.

Benefit and criticalities. There is a lack of communication among the main divisions: each one has their procedures and their own process to collect information. There is a lack of standard procedures and digital interaction, able to improve first the internal processes and later to manage relationships with the main suppliers. Thus, collaboration is not realized.

Future Development. There are several projects that are willing to start. They include the downstream traceability of the good by the introduction of a RFID system, the realisation of a business to business platform for the Textile division and the introduction of a PLM system to acquire more data about the product lifecycle. One of the main interesting project, that will bring radical changes inside the organization, is the so called *"e-procurement"* project. The aim of the project is to integrate the different functions of the company and to fix the internal fragmentation under the creation of an organizational structure, that will enable the purchasing function to coordinate the entire organization. The objective is to centralize the purchases and to impose common procedures in order to improve the processes, enhance communication inside the organization and increase the quality of the information by the introduction of a standard schema of references. The organizational change will be supported by the introduction of SAP. It will enable a better management of the information, to create a supplier register and to monitor suppliers performances by the creation of balance score of common KPIs. The system will be the starting point to support the sourcing and vendor selection, the catalogue management, the budget realization and also to enhance the integration with the best suppliers, covering not the execution and collaboration processes.

Dolce & Gabbana

Dolce & Gabbana was founded in 1985, It is an international and recognized brand of the Italian style. The founders are Domenico Dolce and Stefano Gabbana, that guide the company towards the stylistic evolution. The group produces clothes, leather goods, shoes and accessories. Nowadays the brand is spread in 40 countries even Tokyo, Hong Kong, New York and San Paolo.

Company	**DOLCE & GABBANA**
Address	Via Goldoni, 10 20129 MILANO (MI)
Company Web address	www.dolcegabbana.it
Business Sector	Apparel & Textile Products
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear 6 Accessories Design
Turnover	850 million
Number of Employees	2500
Position in the Supply Chain	Finished product manufacturer;
Suppliers	Raw material, Labor suppliers
Customers	Owned shop , wholesaler, E-commerce
Interview date	01/09/17

Supply Chain Structure

Upstream, there is a network of raw material suppliers that must compliant with the standard of quality and the main procedures in order to get rid of the defects. There is a group of Labor suppliers, that execute the majority of the most important phase of production for Dolce & Gabbana. They are around 200 and exclusive for the company. Downstream the company is interconnected to the final customer by wholesaler and mono-brand boutiques (around 259).

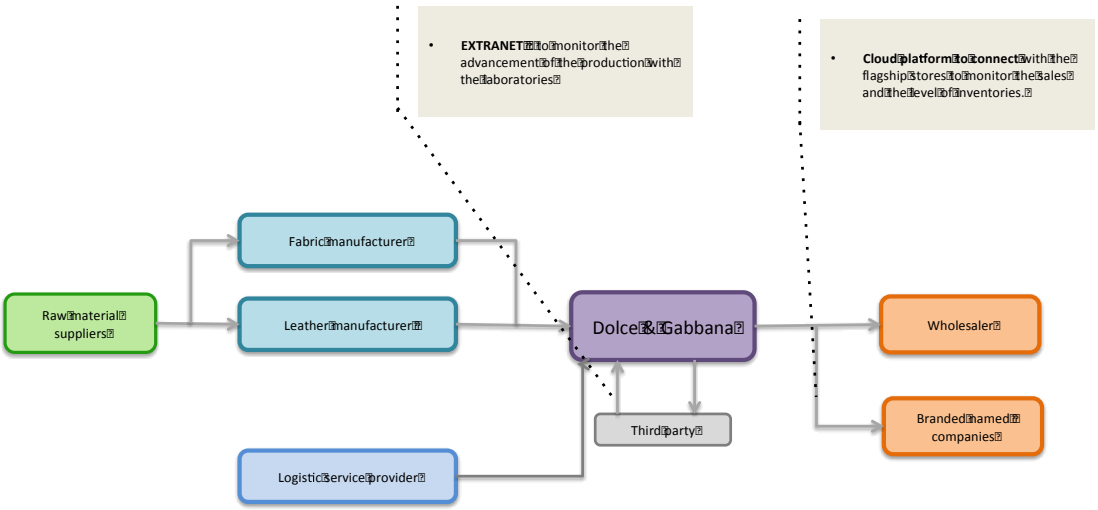


Figure 109 - Loro Piana Supply Chain.

Digitalization Projects

Upstream. Dolce & Gabbana has different relationships with its network of consolidated suppliers, with some of them the number of transactions is high and also the strength in the relationship in terms of trust allowing higher level of integration. However the percentage of suppliers that are involved in collaboration project is still small only 15%. The tool used to support the integration is an extranet platform that contains functionalities such as the sharing of: models and technical data about the collection, bills of materials and at the same time the platform allows the suppliers to share the advancement of the production. Even if the platforms allows to support collaborative activities doesn't support execution processes.

Downstream. The company has implemented with the network of flagship stores a collaborative platform, realized in cloud by Microsoft dynamics 365, in order to monitor the customer base, to share important data about the level of the sales in order to understand the request of the market and to have visibility over the level of stocks inside the flagship stores, returns and claims. The availability of these kind of information facilitate the activity forecast planning and production planning.

Digital Management System and Digital Transport System. The company has recently developed a system in order to radically digitalize all the purchases and sales documents in a PDF format. The system has been created in order to fit with the internal processes of the company. Dolce and Gabbana exchanges the delivery note with the goods still in a paper format, even if its copy is digitalized in order to add information about the state of the quality.

Benefit and criticalities. The information sharing allows a better optimization of the activities and a better visibility over the supply chain. The integration with the main Labor Suppliers is not completed An extension of the projects includes a wider number of suppliers is necessary to facilitate the monitoring of the production and to short the lead time of new product development.

Future Development. An improvement in the process efficiency and in the production and distribution planning phase are the main important goals for the company, to be pursued by the digital transformation.

Moncler

Moncler Spa was founded in 1952 in France, but nowadays the headquarters are located in Italy. The company operates in the fashion industry, in particular it designs, produces, and distributes clothing and related accessories for men, women, and children under the Moncler brand name.

Company	**MONCLER**
Address	Via Stendhal 47, 20144 Milano
Company Web address	www.monclergroup.com
Business Sector	Apparel & Textile Products
Industry	Apparel & Textile Products
Sub industry	Apparel, Footwear and Accessories Design
Turnover	880 mln €
Number of Employees	1800
Position in the Supply Chain	Manufacturer and sellers
Suppliers	Raw material suppliers, Manufacturing suppliers
Customers	Wholesalers, third parties stores, final customers
Interview date	01/09/17

Supply Chain Structure

Upstream, the company has strong and deeply integrated relationship with 120 suppliers. There are final product supplier specialized for some manufacturing processes, not directly managed by the company, and also suppliers for whom Moncler buys raw material. Downstream, the company exploit a well-managed network of stores and boutiques to better reach customers, providing great experience, as well as the wholesale distribution channel. There are 207 mono-brand shops (173 Directly Operated Stores) in exclusive location worldwide as well as whole sales stores. It also sells through Department stores and Multi Brand international stores, concerning wholesalers, spread all over the world.

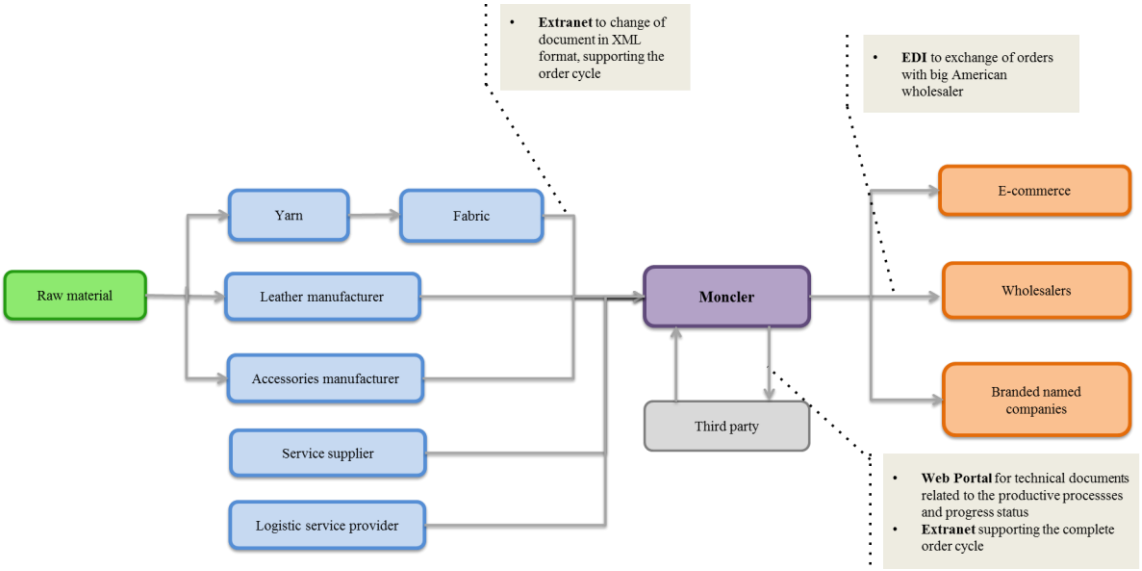


Figure 110 – Moncler Supply Chain.

Digitalization Projects

Upstream. Extranet is used to efficiently manage the set of suppliers. It aims at supporting the complete Order cycle, allowing the exchange of all the documents and information from orders to payments. With the Labor Suppliers, it implements also a Web Portal, with which it is possible to keep control of the progress status of the manufacturing activities.

Downstream. Moncler uses EDI channel to exchange information with American wholesalers, since 2012 after an explicit request. These actors are the biggest department stores, that are the 10% of the total wholesalers, but they generate the highest percentage of the company's turnover. Moncler exchange structured information and documents related to the full Order Cycle from orders to invoices. Customs practices are managed in EDI format, in outsourcing.

Digital Management System and Digital Transport System. The company uses Digital Archiving solution for active cycle, and every year are archived 14000 account receivable documents. The technological solution is developed and managed internally, due to both lower maintenance costs and the opportunity to better manage the process. The company is not enough structured in term of purchasing procedure to be able to digitalize documents concerning this side of the supply chain.

Benefit and criticalities. The main benefit is a remarkable increase of the level of efficiency, resulted from the Digital Archiving. It has guaranteed a decrease in the time required for

administrative activities low-value added. In addiction the Web Portal and the EDI channel have considerably improved the relationship with suppliers and clients , reducing cost, increasing efficiency, providing a better service level and enhancing effectiveness of the processes.

Future Development. Moncler wants to implement a project related to the digitalization of passive cycle and the digital archiving, that is planned for the long run, due to the high effort required to change internal procedure.

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7.0 CONCLUSION

7.1 Summary of the main result of the research

7.1.1 Contribution to previous literature

The performed research has been able to provide an innovative approach to the study of e-collaboration in the Italian Fashion Supply Chain, especially related to the diffusion of the e-collaboration tools in the nowadays environments and, above all, to the analysis of the broad world of e-collaboration in the Fashion Supply Chain. In the past, *Alain Yee-Loong Chong (2009)*, in "The relationship between supply chain factors and adoption of e-Collaboration tools: An empirical examination", provides interesting rooms for inventions. It suggested a simple framework to determine the supply chain factors influencing the adoption of e-Collaboration tools among Malaysian E&E organizations' supply chain and it gives directions for future studies. In particular, they should include other relevant factors affecting e-collaboration: first, they should focus on a singular nation and it should include in-depth case studies examining the implementation of e-collaboration tools in the supply chains. In addition, *Chang (2012)* suggests to examine the adoption of the different e-collaboration tools, providing insights regarding e-collaboration decision. Therefore in the literature there isn't a framework able to match all these important factors, in defining the best digital tools, that can support collaboration processes between partners. Other important authors tried to identify the main e-collaboration drivers, but they didn't give any advice concerning the digital tools typologies, that best fits each situation. In addition, they tried to focus on the phenomena taking into consideration more countries and sectors each time. It is interesting instead to focus on a specific country, like the Italian market, and on a particular sector, like the Fashion industry. The national influence and the sector characteristics are indeed fundamental factors to be taken into consideration once a time. Therefore, this research project comprehensively analysed all the factors that intervene in influencing the e-collaboration adoption, clarifying its extremely important role, through a set of critical variables which have never been investigated before in relation to the Italian Fashion Industry. Accordingly, the major contribution of this thesis, in respect to the previous literature, is a further improvement of knowledge related to the e-collaboration in the Italian Fashion Industry, through two different innovations. First, an "architectural innovation" has been developed through an holistic framework. It includes all the investigated e-collaboration enhancing factors, related to the Relationship Strength and Supply Risk and the interactions occurring in the definition of different environments. For the first time,

an holistic framework will include a complete set of components that represents companies' attributes is designed. Second, a "component innovation" will be performed through the analysis of digital tools that best-suited each situation. It is evident that also for what concern the solution, the approach through which e-collaboration is studied changes: there is a strong focus on the Fashion sector both for what concern the Risks factors and the technologies more suitable to the processes.

It is the first time that a study introduces a definition of the best suitable digital tool supporting the e-collaboration process, basing on the relationship characteristics and the supply-peculiarities. This innovative approach creates stimulating challenges among management of fashion companies, as far as it highlights new improvement aspects in a more and more challenging environment.

Thanks to these results, fashion companies face the evidence that digital tools – especially tools supporting E-collaboration processes– are a powerful collaboration leverage: the theme of efficiency is even more critical, but managers should be also aware that digital tools effectiveness can be used as a differentiating factor to make the Fashion companies more integrated with their supplier base. The second, but not less relevant, the innovative aspect of this research is the approach to the modeling aspect related to the study of e-collaboration drivers and enabling factors. Indeed, it is the first research which has developed a comprehensive and complete framework including all the major variables influencing e-collaboration tools adoption.

7.1.2 Answer to the research question

Research Question N.1 – What is the E-collaboration adoption level in the B2B relations in the Fashion Industry?

The Fashion sector is characterized by an harsh competition, short time to market, high fragmentation, the necessity to introduce innovative products and the need of high service level, to best satisfy the end customers. First of all, there is no strong community with the purpose to facilitate the integration among actors. In the past a project called MODA ML aimed at creating a standard XML shared in the sector. The project failed due to the complexity of the language, the lack of shared standards in the sector, the high level of fragmentation and the huge investments needed. Secondly, Fashion sector, managing very featured and customized

products, have heterogeneous complexities to manage. On the one hand the demand variability of the customer is very high and difficult to predict because it is based on customer's tastes. On the other hand, the short time-to-market and innovation bring coordination to the top of the priorities. Despite the complexity, the e-collaboration phenomena diffusion is still limited compared to other sectors. The low level of e-collaboration diffusion is mainly caused by: the industry is very fragmented, and companies are grouped in close districts; many suppliers, in particular the Labor suppliers, are small, unstructured and with low financial resources; Fashion Houses usually changes the supplier base to acquire new techniques and innovation; the lack of sector standards. For this reason, it appears clear that e-collaboration usually happens when a "Big Player", in supply chain, has enough resources and trading power to impose a standard over the supply network, to support and train the small realities towards digitalization path. The adoption of web platform is one of the main spread tool to support the relationship between partners. It could have different functionalities, from a simple support of the order cycle, the exchange of technical data about the product, the placement and monitoring of the production, to the creation of price catalogue and sales report communication. In addition, it enables companies to exchange and develop private information regarding models and the future collection features. Web Platform represents the main used tool supporting Fashion House and the small Labor Suppliers relationship. Thanks' to that, there is the possibility to enhance the relationship and collaborate in the models' creation with the suppliers. Downstream instead the main supporting tool between the Fashion House and the Big retailers is EDI. EDI allows the exchanges of documents that goes beyond the simple exchange of order cycle documents, for instance sales report and inventory level in the main warehouses. In addition, the possibility to have visibility on the selling data allows also to plan the logistic activities necessary for the replenishment. The manufacturer-retailer collaboration enables the two actors responding faster to the demand changes, being closer to the market in order to catch the preferences of the final customers and creating products that can be appreciated.

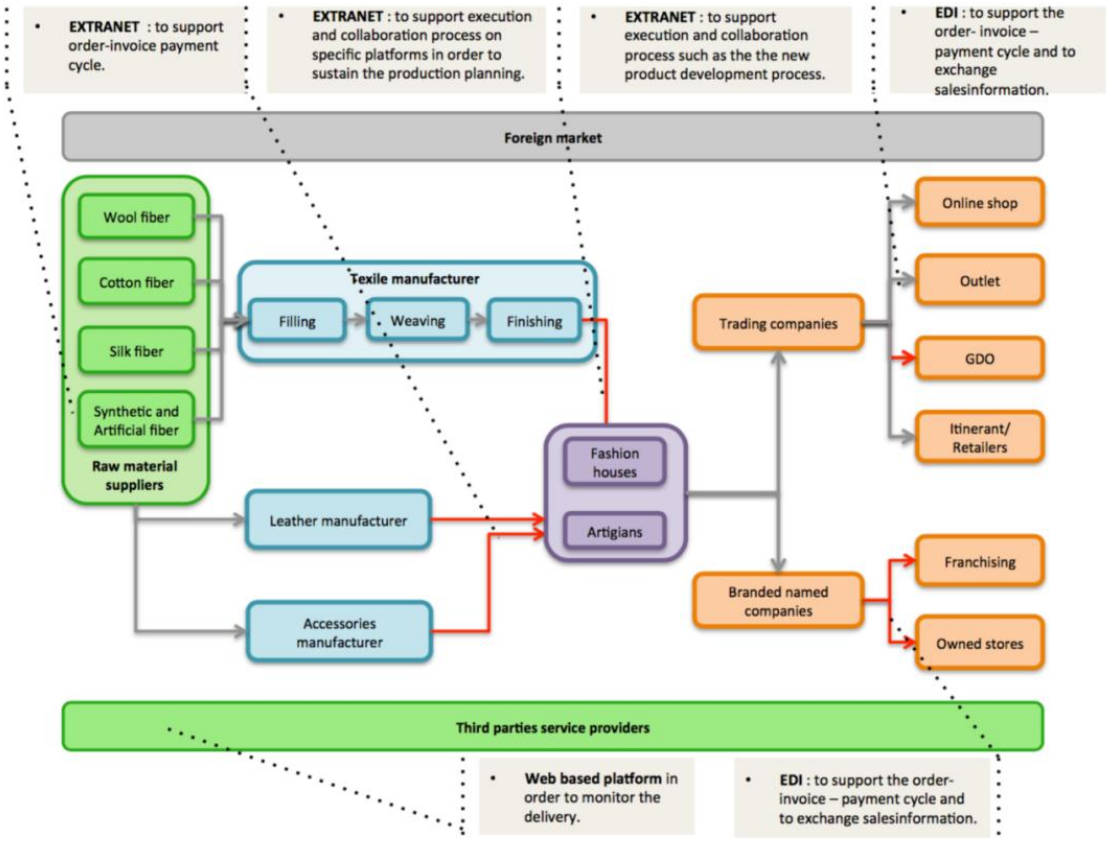

Figure 111 - Distribution of the main digital instruments through Fashion Supply Chain.

Research Question N.2 – What are the factors that affect the e-collaboration adoption, between the Fashion Houses and Labor Suppliers?

The research activity has been driven through the development of a holistic framework which is able to model in a comprehensive and concise way the e-collaboration implementation choice made by Fashion Houses. The developed framework is able to identify the most relevant variables affecting Fashion Houses choices. The analysis of the literature was conducted in order to understand the main models over the e-collaboration field. The majority of them posed the attention over the main factors that enhance the adoption of digital tool over the collaboration processes. In particular, the main variables have been grouped in Relationship Strengths and Supply Risk. The major findings of the research highlighted that the former takes into account the environment of trust, respect and communication, the latter all the risk factors that affect the relationship between Fashion Houses and Labor suppliers. From the interviews

with experts and the results of the implementation of the developed framework emerges that the variables are influencing the e-collaboration needs. In particular, a further increase in the Supply Risk determines the need of a wider control over the network; while a further increase in the Relationship Strength determines an adoption of advanced tools to support transactional and collaborative processes. Moreover, Strength variables provide the fashion experts with practical information on the competitive advantage, that the relationship can gain with, and on the attractiveness, that the introduction of digital tools can generate. Risk attributes are instead relevant since they characterize the context to which the partners belong. These variables are not directly manageable by the Fashion Houses but they are direct consequences of the main Supply chain strategic management decisions.

Research Question N.3 – Which are the optimal technologies to be adopted for the specific combination of the factors?

The main, and last, research objective is to provide advice about the right digital tool to adopt, in the different situation a Fashion House can face. Starting from the finding of Research Question N.2, the model goes head covering the gap found in the literature. Matching the Macro-variables in analysis with the most suitable technological tools, the model can provide a good roadmap to identify best digital tool supporting the relationship, to benchmark companied with the main competitors and also to find interesting solution for driving the change. E-collaboration is realized with a good level of maturity in the relationship and when there is the necessity to increase the control over a complex supply chain. The e-collaboration phenomena is able to facilitate the process of coordination for the Fashion Houses over the main suppliers, enabling the flows of goods and information, enhancing the interactions for the sake of a common objectives. The e-collaboration is not sometimes the best solution, but it can be applied whether there is a sufficient level of maturity in the relationship with the supplier and the need of visibility over the activities conducted externally because extremely strategic. All the knowledge, coming from several University Courses and the Literature analysis, provides understanding about e-collaboration tools that could be useful in supporting collaboration among partners, in each situation. Case studies allow, instead, to have a clearer picture of the major factors enabling of e-collaboration and the digital tools to support it. The aim of them is to validate the results obtained through the comprehending of how company behave in the different situations, through interviews with main experts of three Fashion Houses: Loro Piana,

Dolce & Gabbana and Moncler. The model is good instrument to describe intrinsic characteristics of the Fashion House-Labor Suppliers relationships, and to investigate the correct tool and practices able to support it.

7.1.3 Limitations of the study and further improvements

The factor representing both a strength and a weakness of the developed framework is the required availability of a huge amount of structured data. In detail, the definition of the major quantitative results has been fulfilled through the empirical implementation of the framework, on a sample of Italian Fashion Houses and in respect to their network of labor suppliers. The values are given by a subjective perception, considering the defined KPI's, that are specific for the Fashion Industry and the companies' peculiarities and has finally been calculated as the result of weighted average of the main attributes. The valuation phase of the companies is characterized by subjective judgement in assigning the correct value on a qualitative scale. In addition, the lack of a structured questionnaire was caused by the unwillingness of the fashion expert of undergoing to it. Probably the presence of a more structured information could have led to a more precise classification and to a more reliable clusterization. In addition, the hypothesis underling the model, that is the correlation between the macro variables and the e-collaboration adoption, has been demonstrated in the literature reviews; while the output of the model, definition of digital tools, and by the empirical implementation and validated through three case studies. Probably, a wider sample could have been more appropriated. However, the introduction of statistical analysis could not be implemented. The digital culture variable was not considered as independent, because it has been considered as part of the output of the model, to which it is needed to define a proper strategy. It could have been considered as part of the framework in terms of: the managers' recognition of the strategic importance of the digitalization to support the normal processes, the existence of digital tools to support the normal operating processes, the level of digitalization among the company, the actual level of flexibility in the company towards changes. The research doesn't take into account all these aspects to not add complexity and sensibility in the framework. In addition, this factor should change according to the interviewee's view, that could not be always an exhaustive representation of the company's view. The research does not focus also on the particular case of fast fashion companies, that consider other strategies to connect with the main suppliers. Finally, the model is static, because it takes into consideration actual technologies and can't predict future advancement, that could better facilitate the interaction with the suppliers overcoming the existing barriers.

7.2 Recommendations for practitioners and future research

The main findings of this research project open a new chapter for further studies among the strategic adoption of e-collaboration. The main recommendation for practitioners and researchers among this field is related to the further investigation of the e-collaboration adoption trend. The first suggested step is to deeply explore each area of interest, considering a wider spectrum of Fashion Houses, not only the main important but also considering smaller entities. Another important area of research could be the analysis of the clusters that weren't inspected during the validation phase. In addiction it is also interesting to have a cross country comparison in order to understand if the same factors explain the phenomena also abroad and not only in the Italian Fashion Industry. A deeper analysis on the phenomena of fast fashion could be investigated considering that it is a trend still in developing, and how this phenomena can affect both the empirical Framework and the Model implemented in the Research.

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8.0 References

Aida - Analisi informatizzata delle aziede italiane. (2017, gennaio). Retrieved from https://aida.bvdinfo.com/

Angeles , R., & Nath, R. (2000). The importance of congruence in implementing electronic data interchange systems. Supply Chain Management . *An International Journal , 5*(4), 198-205.

Arnold, U. (2000). New dimensions of outsourcing: A combination of transaction cost economics and the core competence concept. . *European Journal of Purchasing and Supply Management , 6*(1), 23-29.

Attaran, S. (2007). Collaborative supply chain management: The most promising practice for building efficient and sustainable supply chains . *Business Process Management Journal , 13*(3), 390-404.

Bandinelli , R., Rinaldi, M., Rossi, T., & Terzi. (2013). New product development in the fashion industry: An empirical investigation of italian firms. . *In- ternational Journal of Engineering Business Management - Special Issue Innovations in Fashion Industry , 5*, 91-99.

Batt , P., & Purchase , S. (2004). Managing collaboration within networks and relationships . *Industrial Marketing Management , 33*, 169-174.

Battista, C., & Schiraldi, M. (2013). The logistic Maturity Model: Application to a Fashion Company . *nternational Journal of Engineering Business Management, Special Issue Innovations in Fashion Industry , 29*.

Bechini, A., & Cimino, M. (2008). Patterns and technologies for enabling supply chain traceability through collaborative e-business . *Information and Software Technology , 50*(4), 342-359.

Bertelè , U., Rangone , A., & Mainetti S. . (2004). *Il B2b in Italia.* Rapporto dell'Osservatorio B2B della School of Management del Politecnico di Milano.

Bruce M., & Daly, L. (n.d.). *Challenges of fashion buying and merchandising.* Hines.

Caniato , F. (2014). Integrating international fashion retail into new product development. *International Journal of Production Economics, 147*, 294-306.

Caniels , M., & Gelderman , C. (2007). Power and interdipendence in buyer supplier relationships: A Purchasing portfolio approach . *Industrial marketing Management , 36*, 219-229.

Carniene , R., & Vienazindiene , M. (2014). Agility and responsiveness managing fashion supply chain. . *Social and Behavioral Sciences , 150*.

Chan, F., Chong, A., & Zhou , L. (2012). An empirical investigation of factors affecting e-collaboration diffusion in SMEs'. *int. J. Production Economics, 138*(138), 329-344.

Chan, S., & Davis, T. (2000). Partnering on Extranets for Strategic Advantage . *Information Systems Management , 17*(1), 58-64.

Chatterjee, D., & Ravinchandran, T. (2004). Beyond exchange models: Understanding the structure of B2B information systems. *Information systems and e-Business Management , 2*, 169-186.

Chong, A., & Ooi, K. (2009). Influence of interorganizational relationships ON SMEs' e-business adoption. *internet Research, 19*(3), 313-331.

Christopher, M. (1998). *Logistic and Supply chain management.* Edinburgh Gate: Prentice Hall.

Christopher, M., Lowson , R., & Peck, H. (2004). Creating agile supply chains in the fashion industry . *International Journal of Retail and Distribution Management , 32*.

Cillo, P., & Verona, G. (2008). Search styles in style searching: Exploring innovation strategies in fashion firms. . *Long Range Planning , 41*, 650-671.

Corswant, F., & Fredriksson, P. (2002). Sourcing trends in the car industry: a survey of car manufacturers' and suppliers' strategies and relations. . *nternational Journal of Operations & Production Management , 22*(7/8).

Cousins , P. (2002). A conceptual model for managing long-term inter-organizational relationships. *European Journal of Purchasing and Supply Management, 8*(2), 71-82.

Cox , A. (1999). Power, value and supply chain management. *An International Journal, 4*(4), 167-175.

de Leeuw, S., & Fransoo, J. (2009). Drivers of close supply chain collaboration: one size fits all? *International Journal of Operations & Production Management, 29*(7), 720-739.

De Toni, & Meneghetti. (n.d.). The production planning process for a network of firms in the textile-apparel industry. *International Journal of Production Economics, 65*, 17-32.

Dyer , J., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. . *Academy of Management Review , 23*(4), 660-679.

Evans, G., & Towill, D. (1993). Dynamic Supply Chain Performance: Assessing the Impact of Information Systems . *Logistics Information Management, 6*(4), 15-25.

Fawcett, S., & McCarter, M. (2008). Benefits, barriers, and bridges to effective supply chain management . *Supply Chain Management: An International Journal , 13*(1), 35-48.

Federchimica. (2017). Retrieved from http://www.federchimica.it/

Forza , C., & Vinelli, A. (2000). Time compression in production and distribution within the textile-apparel chain. *Integrated Manufacturing Systems , 11*, 138-146.

Ganesan, S. (1994). Determinants of Long-Term Orientation in Buyer-Seller Relationships. *58*(2).

Garcia-Dastague, S., & Lambert , D. (2005). An evaluation of process-oriented supply chain Management frameworks. *Journal of Business Logistic, 26*(1).

Gereffi , G., & Memodovic , O. (2003). The global apparel value chain. *UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION* .

Goffin, K., Lemke, F., & Szwejczewski, M. (2006). An exploratory study of close supplier-manufacturer relationships. . *Journal of Operations Management , 24*(2), 189-209.

Guercini, S., & Runfola, A. (2010). Business networks and retail internationalization: A case analysis in the fashion industry. . *Industrial Marketing Management , 39*, 908-916.

Hart , P., & Saunders, C. (1997). Power and Trust: Critical Factors in the Adoption and use of Electronic Data Interchange. *Organizational Science , 8*(1), 23-42.

Hasselbring , W., & Weigand , H. (2001). Languages for electronic business communication: state of the art . *Industrial Management & Data Systems , 101*(5).

Heckmann. (2015). A criticalreviewonsupplychainrisk definition, measure and mmodeling. *Omega , 52*, 119-132.

Heuer, D., & Brettel , M. (2015). Brand competition in fashion e-commerce. . *Elec- tronic Commerce Research and Applications.* .

Holland , C., Lockett , G., & Blackmann , I. (1992). Planning for Electronic Data Interchange . *Strategic Management Journal, 13*, 539-550.

Hsieh, C., & Lin, B. (2004). mpact of standardization on EDI in B2B development . *Industrial Management & Data Systems, 104*(1), 68-77.

Huang, Z., Janz, B., & Frolick, M. (2008). A comprehensive examination of Internet-EDI adoption . *Information Systems Management , 25*(3), 273-286.

Hughes , J., & Weiss , J. (2007). Getting closer to key suppliers. *CPO Agenda, Spring* , 19-25.

Iacovou , C., Benbasat, I., & Dexter , A. (1995). Electronic data interchange and small organizations: adoption and impact of technology . *MIS Quarterly , 19*(4), 465-485.

Icasati-Johanson, B., & Fleck, S. (2003). Impact of ebusiness supply chain technology on inter-organizational relationships: stories from the front line.

ISTAT. (2017). Retrieved from http://www.istat.it/it/

James, A. (1998). Expanding the Reach of Electronic Commerce: The Internet EDI Alternative. *nformation Systems Management , 15*(3), 7-15.

Jassawalla, A., & Sashittal, H. (1998). An examination of collaboration in high-technology new product development processes . *Journal of Product Innovation Management, , 15*(3), 237-254.

Johnsen, T. (2014). *Purchasing and supply chain management a sustainability perspective.* New York: Routledge.

Jun, M. (2000). EDI use and participation models: from the inter-organizational relationship perspective . *Industrial Management & Data Systems , 100*(9), 412-420.

Kallioranta , S., & Vlosky , R. (2004). Information exchange in vendor managed inventory . *International Journal of Physical Distribution & Logistics Management, , 37*(2).

Kippenberg , T. (2000). From intranet to extranet . *The Antidote, 5*(1).

Kock, N. (2010). Encyclopedia of E-Collaboration. *Texas A&M International University, USA.*

Kraljic , P. (1983). Purchasing must become supply management. . *Harvard Business Review , 61*(5), 107-117.

Lamming , R., Johnsen, T., Zheng , J., & Harland, C. (2000). An initial classification of supply networks. *International Journal of Operation and Production Management, 20*(6), 675-691.

Lankford , W., & Johnson , J. (2000). EDI via the Internet. *Information Management & Computer Security, 8*(1), 27-30.

Lee, H., & Whang , S. (2000). Information sharing in a supply chain . *International Journal of Technology Management, 20*(3/4), 373-387.

Leonard-Barton , D. (1992). Core capabilities and core rigidities. . *Strategic Management Journal, Summer(special issue) , ,* 111-126.

Li, W. (2014). Risk and benefits brought by formal sustainability programs on fashion enterprises under market disruption . *Resources, Conservation and Recycling. .*

Ling, R., & Yen, D. (2001). Extanet: A new wave of Internet . *S.A.M. Advanced Management Journal. , 66*(2), 39-45.

Malone, T., & Crowstone, K. (1994). The interdisciplinary study of coordination. . *ACM Computer Surveys, , 26*(1), 87–119.

Martino , G., Fera, M., Sarno, D., Iannone, R., & Miranda, S. (2015). *In- ternational Journal of Engineering Business Management - Special Issue Innovations in Fashion Industry.*

Marufuzzaman, M. (2010). A dynamic approach to determine the product flow nature in apparel supply chain network. . *International Journal of Production Economics , 128*, 484-495.

Masson , R., Iosif, L., MacKerron, G., & Fernie, J. (2007). Managing complexity in agile global fashion industry supply chains. . *International Journal of Logistics Management , 18*(2), 238-254.

Mayer , R. (1995). An integrative model of organizational trust. *Academy of Management Review , 20*(3), 709–734 .

Mentzer, J., DeWitt, W., Keebler, J., Min, S., Nix, N., & Smith, C. (2001). Defining Supply Chain management. *Journal of Business Logistics , 22*(2), 1-25.

Michelino, F., Bianco, F., & Caputo, M. (2008). Internet and Supply Chain management: adoption modalities for Italian firms. *Management Research News , 31*(5), 359-374.

Ngai, E., Moon , K., & Riggings , F. (2008). RFID research: An academic literature review (1995–2005) and future research directions . *Int. J. Production Economics , 112*, 510-520.

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation sciences* , 1-13.

Nøkkentved, C. (2000). *Collaborative Processes in E-supply Network, Center for Applied Management Studies,* . Copenhagen.

Oh , J., & Rhee , S. (2008). The influence of supplier capabilities and technology uncertainty on manufacturer-supplier collaboration: A study of the Korean automotive industry . *International Journal of Operations & Production Management , 28*(6), 490-517.

(2014). *Osservatorio Nazionale Distretti Italiani* .

Patterson, K., Grimm, C., & Corsi, T. (2003). Adopting new technologies for supply chain management. *Transportation research Part E, 39*(2), 95-121.

Petersen, K., Handfield, R.B , & Ragatz, G. (2005). Supplier integration into new product development: coordinating product, process and supply chain design. *Journal of Operations Management, 23*(3-4), 371-388.

Pfeffer, J., & Salanzick, G. (1978). *The External Control of Organizations.* New York: Harper & Row .

Porter, M. (1985). Technology and competitive advantage . *Journal of Business Strategy , 12*(3).

Pramatari , K. (2007). Collaborative supply chain practices and evolving technological approaches . *Supply Chain Management: An International Journal , 12*(3), 210-220.

Pulevska-Ivanovska , L., & Kaleshovska , N. (2013). Implementation of e- Supply Chain Management. *EM Journal , 2*(4), 312-323.

Quinn, F. (1997). What's the buzz? *Logistic Management, 36*(2), 210-220.

Qureshi, S. (2005). A grounded the- ory analysis of e- collaboration effects for distributed project management. *roceedings of the 38th Hawaii International Conference on System Sciences* .

Ratnasingam, P. (2000). The influence of power on trading partner trust in electronic commerce. *Internet Research, , 10*(1), 56-63.

Reina, D., & Reina, M. (2006). Building Sustainable trust .

Ricchetti, M., & Cietta, E. (2006). *Il valore della moda.* Bruno Mondadori .

Ross, J., Beath , C., & Goodhue, D. (1996). Develop long-term competitiveness through IT assets . *Sloan Management Review , 38*(1), 31-42.

Saaty, T. (1990). *How to make a decision: The analytic Hierarchy Process* (Vol. 48). European Journal of Operational Research .

Sako, M. (1992). *Prices, Quality and Trust: Inter-firm Relations in Britain and Japan.Cambridge, UK* . Cambridge University Press .

Schiraldi , S., & Battista, C. (2013). The logistic Maturity Model Application to a Fashion Company. *International Journal of Engineering* (29).

Shang, R., Chen, C., & Liu, Y. (2005). Internet EDI adoption factors: power, trust and vision. *Proceedings from Seventh International Conference on E-commerce.*

Sianesi, A. (2011). *La gestione del sistema di produzione* . ETAS.

Simatupang , T., & Sridharan , R. (2002). The Collaborative Supply Chain". *The International Journal of Logistics Management,, 13*(1), 15-30.

Sistema Moda Italia. (2015). *Rapporto Sistema Moda Italia.*

Sistema Moda Italia. (2017, gennaio). Retrieved from http://www.sistemamodaitalia.com/it/

Spekman , E., & Sweeney , P. (2006). RFID: from concept to implementatio . *International Journal of Physical Distribution & Logistics Management , 36*(10), 736-754.

Spina, G. (2008). *La gestione d'impresa.* Rizzoli.

Tajuddin, R. (2014). An evaluation of malaysian female consumers' attitude scale towards buying fashion branded goods. . *Procedia - Social and Behavioral Sciences , 130*, 340-346.

Tang, O. (2011). Identifying risk issues and research advancements in supply chain risk management. . *International Journal of Production Economics , 133*, 25-34.

Teece , .., Pisano , G., & Shuen , A. (1997). Dynamic capabilities and strategic management. . *Strategic Management Journal , 18*(7).

Tornatzky, L., & Fleischer , M. (1990). *The Processes of Technological Innovation.* New York : Lexington Books.

Ulaga, W., & Chacour, S. (2001). Measuring customer-perceived value in business markets. *Industrial Marketing Management, 30*(6), 525-540.

Ungson, G., & Park, S. (2001). Inter-firm rivalry and managerial complexity: a conceptual framework of alliance failure. *Organization Science , 12*(1), 37-53.

Unicredit per la Moda. (2017). Retrieved from https://www.unicredit.it/it/piccolemedieimprese/estero/unicredit-international-moda.html

Vaagen, S., & Wallace. (2008). Product variety arising from hedging in the fashion supply chains. *International Journal of Production Economics,, 114*, 431-455.

Vangen, S., & Huxham , C. (2003). Enacting leadership for collaborative advantage: Dilemmas of ideology and pragmatism in the activities of partnership managers. *British Journal of Management, 14*, S61-S76.

Venkatesh, V. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly , 27*(3), 425-478.

Vigtil , A. (2007). Information exchange in vendor managed inventory . *International Journal of Physical Distribution & Logistics Management , 37*(2), 131-147.

Walters, D. (2006). Effectiveness and efficiency: the role of demand chain management. . *The International Journal of Logistics Management , 17*(1), 75-94.

Wang, K., Gou, Q., Sin, J., & Yue, X. (2012). Coordination of a fashion and textile supply chain with demand variations. *Journal of Systems Science and Systems Engineering , 21*(4), 461-479.

White, A. (1996). Internet-enabled supply chain management . *EDI World , 6*(8), 10.

Williams , M., & Frolick , M. (2001). The Evolution of EDI for Competitive Advantage: The Fedex Case . *Information Systems Management , 18*(2), 47-53.

Williamson, O. (2008). Outsourcing: Transaction cost economics and supply chain management. *Journal of Supply Chain Management , 44*(2), 5-16.

Xu, W., & Liu, T. (2003). A web-enabled PDM system in a collaborative design environment. *Robotics and Computer Integrated Manufacturing , 19*, 315-328.

Yen, D., & Chou, D. (2001). Intranets for organizational innovation . *Information Management & Computer Security, , 9*(2), 80-87.

Yonggjian, L. (2014). Governance of sustainable supply chains in the fast fashion industry. *European Management Journal, 32*, 823-836.

Zhu , K., Kraemer , K., & Xu , S. (2003). The Process of Innovation Assimilation by Firms in Different Countries: A Technology Diffusion Perspective on E-Business . *Management Science , 52*(10), 1557-1576.