The Italian Fashion Supply Chain: a model to identify the suitable technology between Fashion Houses and Third Parties Laboratories

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Abstract: The "digital transformation" of the Italian Fashion Supply Chain is difficult to implement due to the complexity and dynamism of the industry. The geographical distribution of companies in small districts adds to the level of complexity of implementation, owing to each vendor operating as small closed systems. Market dynamism arises from the fragmented production activities and the desire for companies to overcome national barriers. Consequently, the introduction of digital tools to support supply chain processes has been identified as being crucial to maintain productivity and increase market share. While firms have understood the potential benefit stemming from the implementation of ICT in Business-to-business (B2b) communications, few Italian Fashion Houses have adopted such collaborative strategies in their supply networks. One of the most promising ways to address this deficiency in implementation is to analyze the relationship between Fashion Houses and their strategic partners, i.e. the Third Parties Laboratories. This work aims to contribute to knowledge in the field by assessing the level of eSupply Chain Collaboration adoption in the Fashion Supply Chain and the choice to implement eSupply Chain Collaboration with Third Parties Laboratories. The potential influence of eSupply Chain is reviewed through the definition of a theoretical framework, seeking to synthetize and model suitable digital tools that companies can implement to increase eSupply Chain Collaboration. The model provides a roadmap to identify digital tools that support these relationship, based on preliminary benchmarks extracted from the Italian Fashion industry.

Keywords: eSupply Chain, Collaboration, Fashion Supply Chain, Fashion Houses, Third Parties Laboratories.

1. Introduction

Technological innovation in the Supply Chain has become crucial, since it allows reaching improvements in efficiency and effectiveness in managing physical, information and financial flows (Patterson et al., 2003). Alongside the productivity gains, the changes that new technologies can entail in the relationship structure among suppliers, producers, distributors, intermediaries and final customer and in the companies' strategic choices are extremely significant. In particular, in a competitive environment, like the Fashion Industry, where information is important, technology plays a crucial role. Thus, for a Fashion Company it is fundamental to acquire the awareness related to an effective and efficient choice of eSupply Chain Collaboration tools among partners.

Based on the literature, there is a lack of studies that have been performed to develop a model that considers the major factors influencing eSupply Chain Collaboration adoption (Yee-Loong Chong et al., 2009). Although many researches have tried to investigate which factors, positively or negatively, influence the adoption of these solutions. Chan et al. (2012) suggested the importance to collect data from developed nations, considering one industry at time. Thus, there is room to create new knowledge related to the topic of eSupply Chain Collaboration adoption in the Italian Fashion Supply Chain. The complexity that characterizes the fashion sector is a feature that introduces point of reflection such as the way the company can respond to rapid change of the market, particularly due to the impulsive behavior of consumers. The capabilities to correctly manage internal and external activities has become crucial for the survival of companies. To pursue this objective, the introduction of Internet and Communication Technologies (ICT) has facilitated the coordination and has strengthened the collaboration possibilities through the possibility to share real time and structured information. Understanding the appropriate digital tools to be implemented has high potential for developing the right strategies for the firms.

This work aims to investigate the connection between Fashion Companies and their choice to implement eSupply Chain Collaboration with Third Parties Laboratories. The potential influence of eSupply Chain Collaboration on managing Supply Chain is studied through a theoretical framework, that aims to identify factors that affect eSupply Chain Collaboration and synthetize the suitable technologies that companies need.

The paper is organized as follows: Section 2 presents evidence from the literature review, Section 3 defines the research questions and adopted methodology, Section 4 introduces the model, and Section 5 summarizes

the contribution and limitations of the model which can be addressed through future works.

2. Literature Review

Different authors have focused their attention on the phenomenon of the eSupply Chain Collaboration and on the collaborative projects that different partners of an industry can implement to improve their efficiency and effectiveness performances. Chong et al. (2009) define the eSupply Chain Collaboration as Business-to-business (B2b) interactions, facilitated by the use of internet technologies. In addition to traditional methods to exchange information like email or phone call, during the years some other technologies have arisen: Electronic Data Interchange (EDI), XML, Extranet. The EDI is a "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 et al., 1992). The XML stands for extensible mark-up language and it is a specific language that defines the structure of the documents, text, images and other parts, identified by a particular set of codes (Hsieh and 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 tags, according to the information they want to introduce. Extranet is the use of internet technology to serve an extended enterprise that includes partners, in order to reach a common goal, such as an increase of the service level (Yen and Chou, 2001). The closeness of the company to its own partners can be obtained throw extranet, that allows the firm to share the main resources.

Furthermore, the literature has analysed the different drivers and barriers for the adoption of the eSupply Chain Collaboration tools. The model of Tornatzky and Fleischer (1990) takes into account contextual variables in the eBusiness assimilation: (i) technological context, that describes both the existing technologies in use and the new technologies, relevant to the firm, that could be introduced to improve the main processes; (ii) organizational context, that takes into account the features of the firm such as scope, size and managerial structure; (iii) environmental context, that is related to the industry, the competitors and the dealing with the governments. A further step in the study was introduced by Yee-Loong Chong et al. (2009) and Huang et al. (2008), with the identification of the main inter-organizational factors (IOR model) in the adoption of eSupply Chain Collaboration: the product complexity, the product volume, the transaction frequency and the trust. The model is based on the empirical analysis, conducted by the authors among Malaysian Electrical & Electronics (E&E) organizations. The first variable, the product complexity, is the first drivers towards eSupply Chain Collaboration. It requires joint effort between the suppliers and the customers within the design and product development areas; for these 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 investing, allowing supply chain integration among the partners. Finally, trust is required as a core element, because, collaboration requires sharing with the partners important information, such as data about the forecast and reserved information about the product structure and design. The Unified Theory of Acceptance and Use of Technology, the UTAUT model by Venkatesh et al. (2003), has covered another gap in the literature, taking into account the attitude of the employees, managers and directors towards the technology. Yee-Loong Chong et al. (2009) have investigated the Small and Medium Enterprises (SME) in Malaysia, taking in consideration the IOR model as factor facilitating the adoption of eBusiness supply chain technology. Five variables are considered, that are (i) the trust, as positive attitude towards partners and the expectation of loyalty and fairness; (ii) the communication, as the ability to transmit important and reliable information in order to take important decisions; (iii) the collaboration, as the same efforts put by the partners to reach the same goal; (iv) the perceived transparency, as the possibility to have visibility over the supply chain avoiding gaps in the information and, finally, (v) the trading partners' power, as the capability of the focal company to impose a standard over the supply. 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 eBusiness tools. This is due to the advent of the Internet, that has become the main mean to obtain less cost flexibility and interoperability. In addition, the focal company has to convince the partners through the communication and the explanation of the benefits of the technologies, rather than by impositions and threats.

Yee-Loong Chong et al. (2009) suggest that future studies should include other relevant factors. Specifically, factors such as national culture can be tested to assess their impact on information sharing among supply chain partners. They also highlight that it would be useful to conduct in-depth case studies examining the implementation of eSupply Chain Collaboration tools in the supply chains. In addition, Chan et al. (2012) suggest, for future researches, to examine the adoption of the different eSupply Chain Collaboration tools and to provide more insights in the eSupply Chain Collaboration decision model development.

3. Objectives and Methodology

Given the identified gap, this paper attempts to contribute to the extant literature by proposing a theoretical framework, which aims to suggest the adequate digital tools for companies, through the identification of the factors that affect the eSupply Chain Collaboration adoption.

To reach this objective, the following research questions were identified:

- RQ1 – What are the factors that affect the eSupply Chain Collaboration adoption, between Fashion Houses and Third Parties Laboratories?
- RQ2 – Which are the optimal technologies to be adopted for the specific combination of the factors?

The employed methodology encompasses specific activities, belonging to two different phases: problem setting and problem solving.

The problem setting phase represents a fundamental stage of the research. First of all, a deep research of the extant literature and the used sourcing strategies has been performed. The model is based on a re-interpretation of the Kraljic Portfolio Model (Kraljic, 1983), with an innovative focus on the Relationship attributes and Fashion Supply Risk. For these reasons the macro-variables under study can be translated into: Strength of the Relationship and Fashion Supply Chain Risk. Thus, the goal of the problem setting is to develop an effective model describing the extant knowledge. The literature classification enabled the recognition of the Fashion Supply Risk and Relationship Strength micro-variables, affecting the adoption of eSupply Chain Collaboration solutions by the companies. These variables have been classified and grouped in order to build up a rationalized model.

The problem solving phase integrates the output of the problem setting with the empirical research. Once the macro and micro variables have been defined and the theoretical framework has been developed, it can be transformed into a quantitative tool for empirical analyses. A qualitative framework can be considered appropriate and effective only whether it can be empirically implemented in an effective way (Nilsen, 2015). Thus, multiple interviews with Fashion Companies have been carried out to collect the data needed for its application. The sample for the analysis includes 17 companies, belonging to the Fashion Supply Chain. They are Italian Fashion Houses of both high and low level positioning in term of price and quality, with a turnover higher than 10 million. They have been retrieved from secondary resources. All the companies have been contacted via email and the sample is made up of companies that accepted to carry out the interview. Through the interviews, the relation of the Fashion House with the Third Parties Laboratories was investigated. 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. Thus, the aim is to build a model able to suggest the correct digital tools to support the communication between the business partners.

4. The Model

The research framework has been built starting from the Kraljic Portfolio Model (Kraljic, 1983), that is useful to reflect on the main strategies adopted by the firms. The model has been modified shifting the focus from the Purchasing Item to the Supplier Relationships. Indeed, the research wants to investigate on the Strength of Relationship and Relationship Risk factors, that can enable or contrast the adoption and implementation of eSupply Chain Collaboration tools. More in detail, the Relationship Strength includes all the attributes related to the Strength of the Relationship among two partners and enabling the adoption of eSupply Chain Collaboration; the Fashion Supply Chain Risks comprehends instead all the Risk factors affecting the Fashion Supply Chain, concerned the specific relation Fashion House-Third Parties Laboratories.

The independent variables used in this research are the macro-variables, Strength of Relationship and Relationship Risk, while the set dependent variable is the eSupply Chain Collaboration tool.

4.1 Strength of Relationship

The main factors regarding the Strength of Relationship are the following ones.

4.1.1 Trust

Trust between the Fashion House and the Third Parties Laboratories is one of the main determinants for the choice of the supplier. Fashion Houses need a high level of privacy and protection of information to avoid that the design of the clothes can be easily spread. Trust plays an important role in the adoption of eSupply Chain Collaboration tools as collaboration involves transparency and sharing information among the supply chain members. When business partners want to adopt Collaboration tools in their supply chain collaboration, an organization that trusts its partners is more likely to reach consensus in terms of achievable benefits by the tools (Shang et al., 2005). In literature, the role played by trust in collaboration has been strongly analyzed: the higher the trust, the higher the willingness to adopt Collaboration tools. In case of eSupply Chain Collaboration solution adoption, the trust is the firms' willingness to trust their supply chain partners in sharing important supply chain information, i.e. product designs (Yee-Loong Chong et al., 2009). There is a positive and significant relationship between trust and the adoption level of Collaboration tools (Yee-Loong Chong et al., 2009).

4.1.2 Communication

Typically, in a B2b environment, individuals from different organizational functions or companies from different sides of the relationship have different points of view (Ulaga and Chacour, 2001). The need of increased and enforced communication bring to an enhancement of collaboration tools 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 eSupply Chain Collaboration tools (Yee-Loong Chong et al., 2009).

4.1.3 Power

In the past, many experts argued that the power of a supplier prevent supply chain collaboration while a more equal distribution of power implies a more collaborative firm (Jassawala and Sashittal, 1998). However, more recently, Caniëls and Gelderman (2007) have concluded that even in situations that are considered as strategic partnerships, there may be an imbalance in power. In fact, power can be used to promote integration of a supply chain, and where there is a clear dominant partner, one party takes the lead to develop collaborative initiatives (de Leeuw and Fransoo, 2009). There is a positive and significant relationship between Power and the adoption

level of eSupply Chain Collaboration tools (Yee-Loong Chong et al., 2009).

4.1.4 Vision

The more two partners have common mission and goals, the more the need of strategic tool to support the continuous interaction among partners emerges. With the Internet, organizations are able to integrate their inter and intra organizational business processes within functional departments and supply chain members via eSupply Chain Collaboration tools (Yee-Loong Chong et al., 2009). There is a positive and significant relationship between Vision and the adoption level of Collaboration tools (Yee-Loong Chong et al., 2009).

4.2 Supply Risk

The main factors affecting the Supply Risk are illustrated below.

4.2.1 Supply network

Supply chains, such as the fashion one, are vulnerable to perturbations resulting from a strong dependence on the players of the other network, such as suppliers or logistics providers. The need for communication and cooperation is always increasing, to assess and manage risks connected to the different stages of the value chain, as well as external and not directly controllable risks, and to be able to ensure continuity in supply chain. There is a positive and significant relationship between Supply network and the adoption level of Collaboration tools (Yee-Loong Chong et al., 2009).

4.2.2 Product Volume and Transaction Frequency

Considering this grouping variable, the risk is determined by the frequency of transaction, the number of collection per year, and all the factors that affect the complexity of products produced by supplier, from operational perspective. According to Chang et al. (2003), firms in a high transaction frequency supply chain environment not only compete based on price but rather on the ability to solve process and product problems with supply chain partners and customers. The volume and the frequency of transactions are supply chain characteristics that can differentiate between adopters and non-adopters of 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 Collaboration tools (Yee-Loong Chong et al., 2009).

4.2.3 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 have to work closely with its suppliers and customers, in areas such as product design, production, business strategy, and distribution. Enterprises with higher product complexity "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" (Chang et al., 2003). If the products require minimum specification, there will be less needing to invest in information systems that integrate with suppliers (Chatterjee and Ravichandran, 2004). Lambert et al. (2005) and Michelino et al. (2008) also support the idea that a complex product will influence the adoption of Collaboration tools. There is a positive and significant relationship between product complexity and the adoption level of Collaboration tools (Yee-Loong Chong et al., 2009).

4.2.4 Technology and Knowledge

The more suppliers have recognized skills and capabilities, own proprietary technology and are very active in research, the more strategic partnerships are desired (Von Corswant and Fredriksson, 2002; Goffin et al., 2006). Capabilities are intended as, for example, familiarity of a firm with technology, knowledge and competencies or technological and design capabilities (Oh and Rhee, 2008) and, for what concern new product development projects, Petersen et al. (2005) found that supplier process and product knowledge are the most relevant, in building close relationship. As the constant positive trend to communicate and design output through technologies it is possible to say that there is a positive and significant relationship between Knowledge and Technology and the adoption level of Collaboration solutions (Yee-Loong Chong et al., 2009).

Summarizing there is positive relationships between the micro variable and the macro-variable, and between the macro-variable and the adoption of eSupply Chain Collaboration tools, as described in figure 1, below.

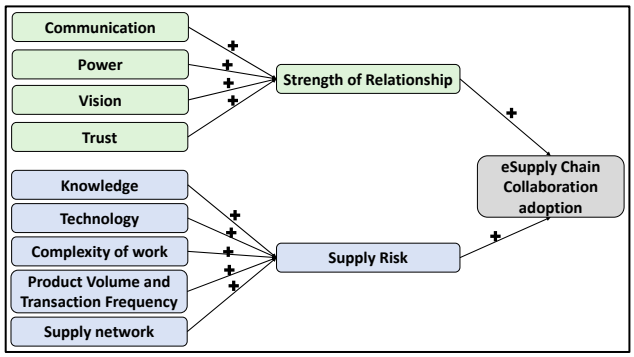

Figure 1: Theoretical Framework

4.3 Empirical Analysis

Once defined the framework, the interviews have been carried out. Each company was given a different score from 1 (low) to 3 (high), related to the level of different attributes affected the two macro-variables. In appendix A and appendix B there are general considerations to allocate the scores to each firm. All attributes have the same weight in the final computation for addressing the company a low/medium/high level of Supply Risk and Strength of Relationship (see appendix C and D). In this way, 5 different clusters have been identified, considering the technologies used by the companies.

4.3.1 Cluster 1. High Risk and High Strength

In this cluster the suppliers could be international or with high numerosity. They perform important tasks or components for the final product. For this reason, the introduction of an Extranet with different functionalities is strategic to create an environment that allows the exchange of feedbacks and sharing ideas. Fashion Houses 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. Three companies belong to this cluster.

4.3.2 Cluster 2. High Risk and Medium Strength

Three companies belong to this cluster. Companies are characterized by a high supply complexity and medium integration, and collaboration between the Fashion Houses and their suppliers. The supply network is not enough controlled by the Fashion House, due to the absence of common vision and the lack of an intense digital culture. The main digital project implemented are the development of an Extranet to assign commissions to different suppliers and the automated control over the advancement of the production.

4.3.3 Cluster 3. Medium Risk and High Strength

The second cluster is featured by high investment of the relationship, with a medium level of risk. 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. The medium level of the risk is due to the restrained number of suppliers, that are selected on the basis of particular certification of quality and sustainability. Companies use EDI system and Extranet to cover activities like the order cycle process, the advancement of the production, the level of inventory and the exchanges of technical requirements. Three firms belong to this cluster.

4.3.4 Cluster 4. Medium Risk and Medium Strength

The cluster is featured by five firms that use Extranet 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. The medium level of Supply Risk is due to the low number of suppliers, small entities spread near the company, with very low digital culture. The companies have limited visibility over the processes. 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 an Extranet. The Extranet could be more structured in order to support the order payment cycle and to register the advancement of the production.

4.3.5 Cluster 5. Low Risk and Low Strength

In this cluster, there are three companies that do not rely on a specific base of suppliers. Thus, the Strength of Relationship is low due to the impossibility to gain solid connections with the suppliers. The Supply Risk is low because the suppliers are usually performing very simple task and not core activities, the reason why they are easily changeable. A deep integration, in terms of joint investment in technology and joint production planning, seems quite difficult to realize. Companies use elementary form of communication, such as mails and phone calls to cover the basic execution processes.

The number of Fashion Houses interviewed are still limited, but it is important to contemplate the other possible configurations between the two macro-variable that result from the three types of level considered. For this reason, the solution output has been divided into nine areas of interest, to give evidence of the high medium and low level for both two macro-variables, as it is shown in the figure 2.

4.3.6 The Other Quarters

Following, the other four areas, not identified from the interviews, are discussed, based on the general knowledge derived from the interviews.

In the quarter distinguished for low level of Supply Risk and medium level of Strength of Relationship, there are companies that rely on few suppliers. They have low expertise and simple task assigned. The base of suppliers is quite fixed, and the supplier could be located near the Fashion House. 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 could be realized sharing file through a cloud system or an internet network. The quarter with low level of Supply Risk and high level of Strength of Relationship is made up of 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 to simply the connection with these entities provides a good reason to adopt more sophisticated form of structured information, like XML standard. In the quarter characterized by medium level of Supply Risk and low level of Strength of Relationship, the Fashion Houses rely on a wider network of suppliers. There 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 number of the suppliers or their spreading worldwide. There is the necessity to control the advancement of the production in order to prevent delays. The suppliers have to be 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.

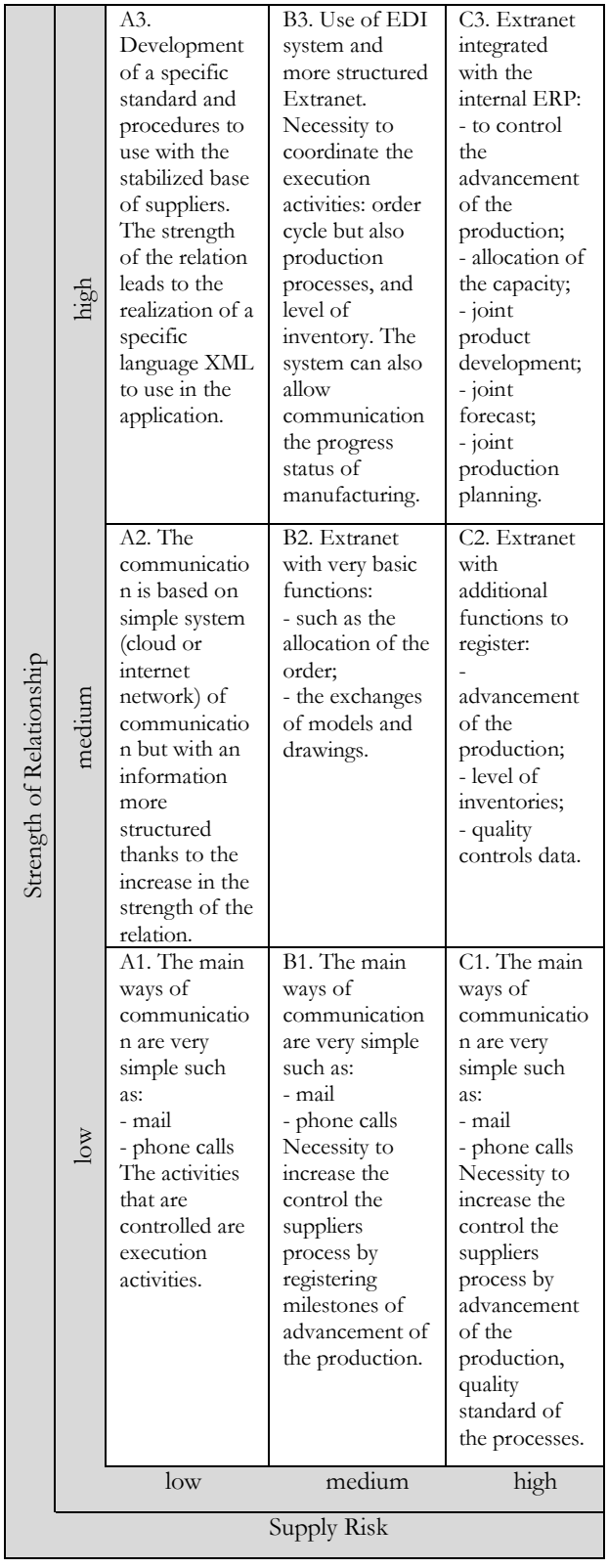

Figure 2: Solution Output

The last quarter is composed of high level of Supply Risk and low level of Strength of Relationship. 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 information is exchanged through simple mails and phone calls. Suppliers should let the Fashion House monitor and control the advancement of the commission and the quality of the processes.

4.4 Optimal and Critical Quarters

In the following part, the optimal quarters and the critical ones are described considering limits and opportunities, in order to suggest the appropriate digital tools to support the communication between the business partners.

The optimal quarters are the ones called *A1, B2 and C3,* 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 with the suppliers is very weak and also the risk is very low, due to the high number of suppliers that do not represent a strong and an established supplier base. There is coherence between the digital supporting tool and the need of control and relationship enhancement.

B1, C1, C2 and A2, A3, B3 are the critical areas. The first three quarters are critical because of the complexity of the network of suppliers, and the low strength of the relationship with them (in terms of Trust, Power, Communication and Vision). The suggestion is to increase the level of strength of the relationship or decrease the level of Relationship Risk, for example with a rationalization of the supplier-base. It is important to keep in mind that not in all the situation, increasing the Relationship Strength, it is possible to adopt digital tool that could control the risk. *A3 and A2-B3* need to be taken under attention because companies invest in high Strength of the relationship with low level of Relationship Risk. It could represent a waste of resources, money and time. If the company needs high quality standard to gain high margin, it may afford such investments. A suggestion could be to consider the possibility to integrate vertically.

5. Conclusions

This work is able to illustrate an innovative approach to study eSupply Chain Collaboration in the Italian Fashion Supply Chain, related to the diffusion of Collaboration tools in the present environments. The model provides a roadmap to identify digital tools supporting the relationship between Fashion Houses and Third Parties Laboratories, to benchmark Italian Fashion companies with their main competitors and to find interesting solution for driving the change. Based on the different combination between the level of the Supply Risk and the Strength of Relationship, a suitable digital tool is suggested to support the communication between the two fashion business partners. Nevertheless, this work has some limitations. The model is static, because it takes into consideration actual technologies and cannot predict future advancement, that could better facilitate the interaction with the suppliers overcoming the existing barriers. The assessment of the scores are given by a subjective perception, for some attributes, specific for the Fashion Industry and for the peculiarities of the companies. To improve the model future research could perform other interviews that may allow the confirmation of the other four quarters discussed. In fact, a wider sample could have been more appropriate, and the introduction of statistical analysis would be useful.

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Appendix A. QUANTITATIVE ATTRIBUTES SCALE – SUPPLY RISK

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<n<50) distributed at a national level	The number of suppliers is high (n>50) and they are distributed at international level
TECHNOLOGY	Completely absence of digital tool for the normal operational activities, lack of visibility and control over the processes	Normal use of digital tool to execute of operational activities, good management of the information	Digital culture present at the strategic level, high level of transparency and visibility
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 on Fashion Sector, they have long period expertise and they used to perform core activities for the Fashion Houses.
PRODUCT VOLUME AND TRANSACTION FREQUENCY	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

Appendix B. QUANTITATIVE ATTRIBUTES SCALE – STRENGTH OF RELATIONSHIP

ATTRIBUTES	SCORE 1 COOPERATION	2 COORDINATION	3 COLLABORATION
TRUST	Contractual	Competence	Goodwill trust
POWER	Authority rests solely with the individual organization; 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 be mandated by a third party; organisational mission and goals are not taken into account; interaction on a needed basis.	Individual relationship is supported by the organizations 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 project is 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 clearly defined and interrelated roles that constitute formal division of labor; more comprehensive planning is required that includes developing joint strategies and measuring success in terms of impact on needs of those served.

Appendix C. EMPIRICAL IMPLEMENTATION DATASET – SUPPLY RISK

X = Supply Risk	*Weight*	COMPANY 1	COMPANY 2	COMPANY 3	COMPANY 4	COMPANY 5	COMPANY 6	COMPANY 7	COMPANY 8	COMPANY 9	COMPANY 10	COMPANY 11	COMPANY 12	COMPANY 13	COMPANY 14	COMPANY 15	COMPANY 16	COMPANY 17
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	2	1	2
Supply network	0,20	1	2	1	1	1	3	2	2	3	3	3	3	3	1	3	2	2
Complexity of production	0,20	2	2	2	1	3	2	3	2	3	3	3	2	3	1	3	1	3
Knowledge	0,20	2	1	2	1	3	2	2	1	3	3	3	2	3	1	3	1	3
TOTAL	**1,0**	**2**	**2**	**2**	**1**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**3**	**1**	**3**	**1**	**3**

Appendix D. EMPIRICAL IMPLEMENTATION DATASET – STRENGTH OF RELATIONSHIP

Y= Strength of Relationship	*Weight*	COMPANY 1	COMPANY 2	COMPANY 3	COMPANY 4	COMPANY 5	COMPANY 6	COMPANY 7	COMPANY 8	COMPANY 9	COMPANY 10	COMPANY 11	COMPANY 12	COMPANY 13	COMPANY 14	COMPANY 15	COMPANY 16	COMPANY 17
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
TOTAL	***1,0***	**3**	**2**	**3**	**1**	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**2**	**3**	**1**	**2**	**1**	**2**