



# POLITECNICO MILANO 1863

School of Industrial and Information Engineering  
Master of Science in Management Engineering

## e-Commerce B2b: an investigation of technologies in Italy

Supervisor:

Professor Riccardo Mangiaracina

Co-supervisor:

Dott.ssa Clarissa Falcone

Dott. Camillo Loro

Author:

Luca De Dominicis

942823

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# Abstract

The current world scenario shows an always increasing competition among firms, which depends not only from themselves but also from their entire supply chain, since the interrelations among companies nowadays are source of competitive advantage. The e-Commerce B2b technologies aim at optimizing communication and collaboration between companies, providing instruments that decrease transaction cost and increase efficiency. This study aims at defining the current state of e-Commerce B2b technologies in Italy, with a focus on e-Marketplace, which are platforms that matches the buyers and suppliers needs. The study is grounded on empirical research that implies a census of e-Marketplace operating with Italian companies and some interviews to supply chain managers of relevant companies operating in automotive and grocery industries. Results show e-Marketplace platforms are increasing in number and importance, while the most used technology remain the EDI. Large actors result conscious about importance of e-Commerce B2b implementation, but unstructured firms with limited resources still are a barrier for the development on the entire supply chain. It results there is the need to encourage small actors to invest in digitalization, to develop common communication standards and to create a common and conscious vision about the future innovation implementation in the supply chain.

**Keywords:** e-Commerce B2b, collaboration, marketplace, Italy



## Abstract in lingua italiana

L'attuale scenario mondiale mostra una sempre crescente competitività tra le aziende, le quali non dipendono più soltanto da sé stesse ma dalla loro intera supply chain, poiché le relazioni interaziendali oggi sono fonte di vantaggio competitivo. Le tecnologie dell'e-Commerce B2b mirano ad ottimizzare le comunicazioni e la collaborazione tra aziende, fornendo strumenti che diminuiscono i costi transazionali ed aumentano l'efficienza. Questo studio vuole definire lo stato attuale delle tecnologie dell'e-Commerce B2b in Italia, con un focus sugli e-Marketplace, i quali sono piattaforme che combinano le necessità di compratori e venditori. Lo studio effettua una ricerca empirica basata su un censimento degli e-Marketplace operanti con aziende Italiane ed alcune interviste ai supply chain manager di importanti aziende operanti nei settori dell'automotive e del largo consumo. I risultati mostrano come gli e-Marketplace stanno aumentando da un punto di vista numerico e di importanza, mentre la tecnologia più utilizzata rimane l'EDI. Le grandi aziende risultano coscienti dell'importanza dell'implementazione degli e-Commerce B2b, mentre le aziende poco strutturate e con risorse limitate costituiscono ancora una barriera per lo sviluppo dell'intera supply chain. Vi è la necessità di incoraggiare le piccole aziende ad investire nella digitalizzazione, di sviluppare standard comunicativi comuni e di creare una visione comune e cosciente riguardo l'implementazione delle future innovazioni nella supply chain.

**Parole chiave:** e-Commerce B2b, collaborazione, marketplace, Italia



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# Executive summary

## Introduction

The current world scenario is in continuous evolution and businesses have to adapt themselves to new consumers' needs: improved services, customized experience and faster delivery times. In parallel, companies work in a changing competitive scenario with an always increasing competition level and they must adapt business processes to increase quality and efficiency.

The e-Commerce B2b is an opportunity for companies to strengthen their competitive advantage over competitors. It consists in systems and networks based on IT technologies that allow improved synchronization and integration with business partners, facilitating and accelerating communications.

B2b integration IT systems allowed the development of e-Procurement, supply chain execution and supply chain collaboration among firms. These practices leverage on data sharing between business partners in order to synchronize working processes, leading to improved business performances for both actors and to positive externalities for the whole supply chain. They offer improved procurement process based on the reduction of transaction costs and improved resource management.

On the other hand, e-Commerce B2b need initial investment and specialized capabilities to be implemented and a critical mass to result effective for both firms and

supply chain, since a low number of actors are not enough and cannot fully exploit the investment made.

Small and unstructured firms present relevant lacks in term of financial resources and IT capabilities. Consequently, it is reported that usually those companies are not interested in the implementation of integration and communication technologies, generating significant barriers for supply chain evolution.

The aim of this study is the analysis of the current state of e-Commerce B2b technologies in Italy: the work aims at defining which are the most used systems and how much they are diffused, with a particular attention on companies' perspective.

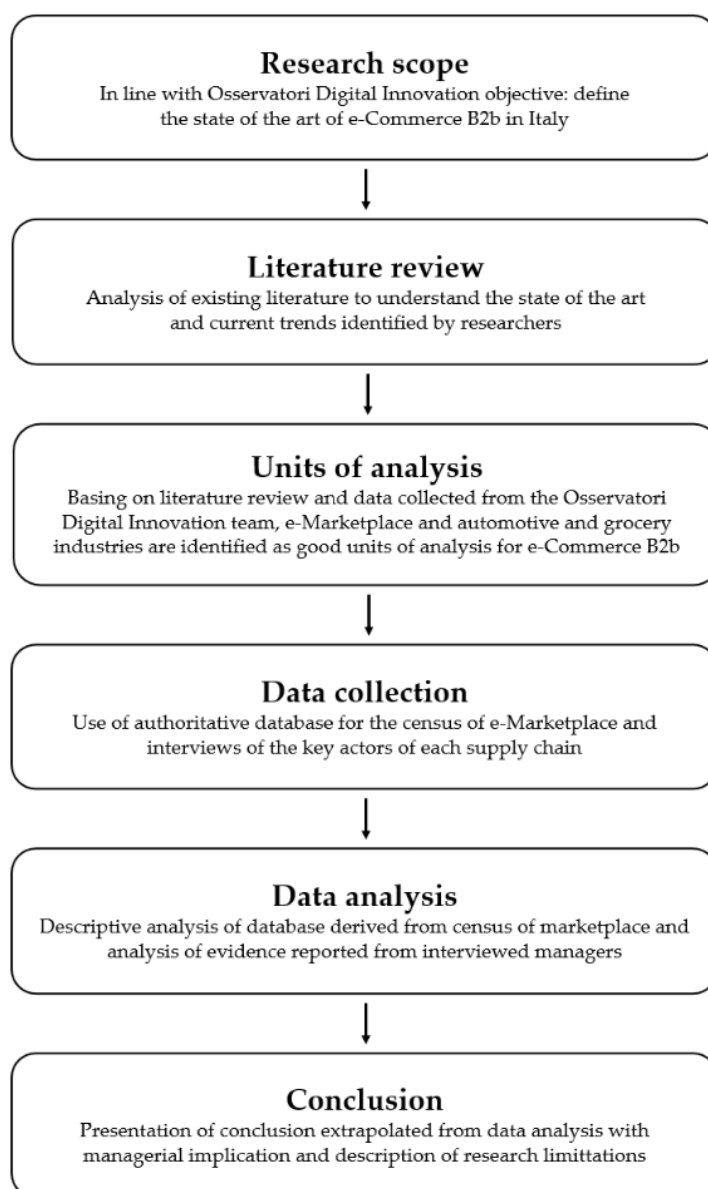
## Methodology

The starting point is the identification of research scope: in line with the Osservatori Digital Innovation of the School of Management of the Politecnico di Milano it has been identified the definition of the state of the art of e-Commerce B2b in Italy.

The work begin with the analysis of existing literature in order to identify the e-Commerce B2b evolution over time, current trend and future expectations of researchers. Through an appropriate review methodology based on an accurate papers' selection, 51 papers have been identified and analyzed, and the relevant information have been extracted.

The units of analysis and the objective of the empirical research have been identified starting from the insights of the Osservatori Digital Innovation of the School of Management of the Politecnico di Milano in line with evidence extrapolated from literature review. To quantify and analyze one of the most relevant e-Commerce technologies, which result in continuous increase due to its ease of use and economic affordability, Electronic Marketplace B2b has been chosen to make a census of all

platforms working for Italian companies. On the other hand, a qualitative analysis to understand the actors' point of view was necessary. Starting from the Osservatori Digital Innovation analysis about the diverse industries supply chain structure and characteristics, the choice was to interview companies belonging to automotive and grocery supply chain, because they represent two opposite examples in terms of supply chain structure and inclination to innovation.



*Figure 0.1: research methodology*

The census of e-Marketplace B2b started with the analysis of three complementary sources of information – i.e., authoritative website rankings, information contained in literature body, and Internet through web mining and keywords research – that were independently examined and then cross-referenced: the marketplaces have to satisfy exact conditions to be selected. The research results in a database of e-Marketplace operating with Italian companies, and data about industry sector, geographical origin, service-provisioning model and payments accepted methods have been collected from authoritative websites, web mining and two appropriate databases. The database with e-Marketplace has been processed and variables have been analyzed individually and then combined and reworked, in order to produce significant insights to describe the state of the art of this technology in Italy.

The analysis of case studies belonging to automotive and grocery industries started with the identification of ideal actors for the interviews. Since the number of interviews is restricted, the choice of the companies is crucial because the research wants to collect insights on the whole supply chain. Consequently, the choice was of firms that interacts with a great number of suppliers and buyers. Those companies can provide their perspective over the supply chain, but also relevant information about both large and small actors of the industry. The interviews have been conducted between February and April 2022 with some pre-structured questions about firm's structure, firm's procurement and sales processes, and about firm's perspective in relation to recent trends and future development. Gathered data have been used to define the supply chain structure and relationships, then evidence have been deeply analyzed to identify concepts and behaviors to confirm literature theories or to provide new interesting insights.

## Results

It is quantified that the e-Commerce B2b in Italy is mainly based on EDI, marketplace and extranet technologies and generates value for 410 billions of euro.

### Marketplace analysis

The census of e-Marketplace operating with Italian companies result in 182 platforms orienting their services only to business clients. Among them, there are 34 marketplace that provide services also to final consumers: they represent the 19%.

Analyzing the year in which marketplace companies are born, it is emerged how there was an exponential increase starting from 2000, with an actual increment of 70% over the last decade. This result derives from two main factors: the spread of the Internet and the born of businesses mainly focused on the provision of intermediation services for intercompany relationships.

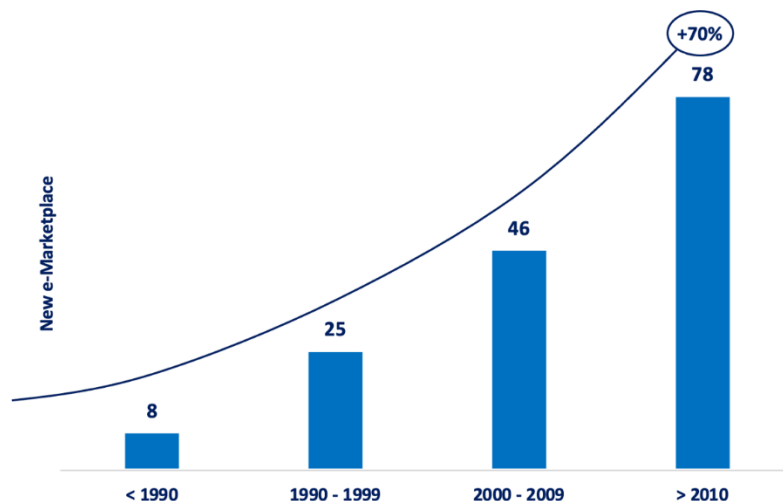
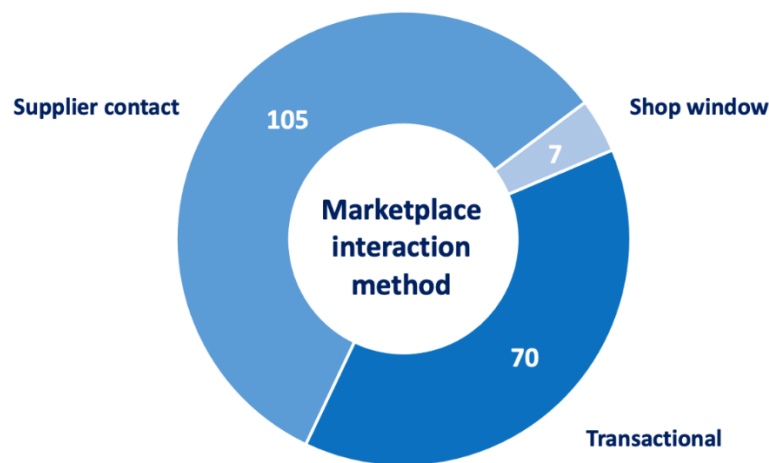


Figure 0.2: new marketplace companies creation trend

Marketplaces are mainly located in Europe (47%), Asia (28%) and America (22%), while the most present countries are United States (38 marketplace), Italy (33), India

(22), China (17), Germany (13) and United Kingdom (12). As predictable, the most contribution is provided by Information Technology advanced areas of the world.

Basing on services offered to costumers, it has been identified three marketplace interaction modalities: shop-window, supplier-contact and transactional. The former offer to suppliers a virtual space where they can show their product for potential buyers, but no other operations are managed from the platform. The supplier-contact marketplaces provide to potential buyers the contact of certified suppliers, providing to buyers the opportunity to compare the offers of several sellers. The transaction-based marketplaces include in their services the purchase process offering secure transactions. From the research results that the 58% of platforms offers services only for contacting the right supplier, the 38% provides also services for the purchase process, and the 4% offers only a virtual space to suppliers.



*Figure 0.3: marketplace classification basing on interaction modalities*

Crossing data with the classification on the base of target typology, it derived that all shop-window address only business and almost all the supplier-contact marketplace are predominantly only B2b (94%), while the transactional ones are much more



balanced, with the 59% of platforms addressing only business and the 41% targeting also final consumers.

Analyzing the geographical distribution basing on interaction methodologies, comparison between transactional and supplier-contact is balanced in Europe, while it is fairly unbalanced towards supplier-contact in Asia and America.

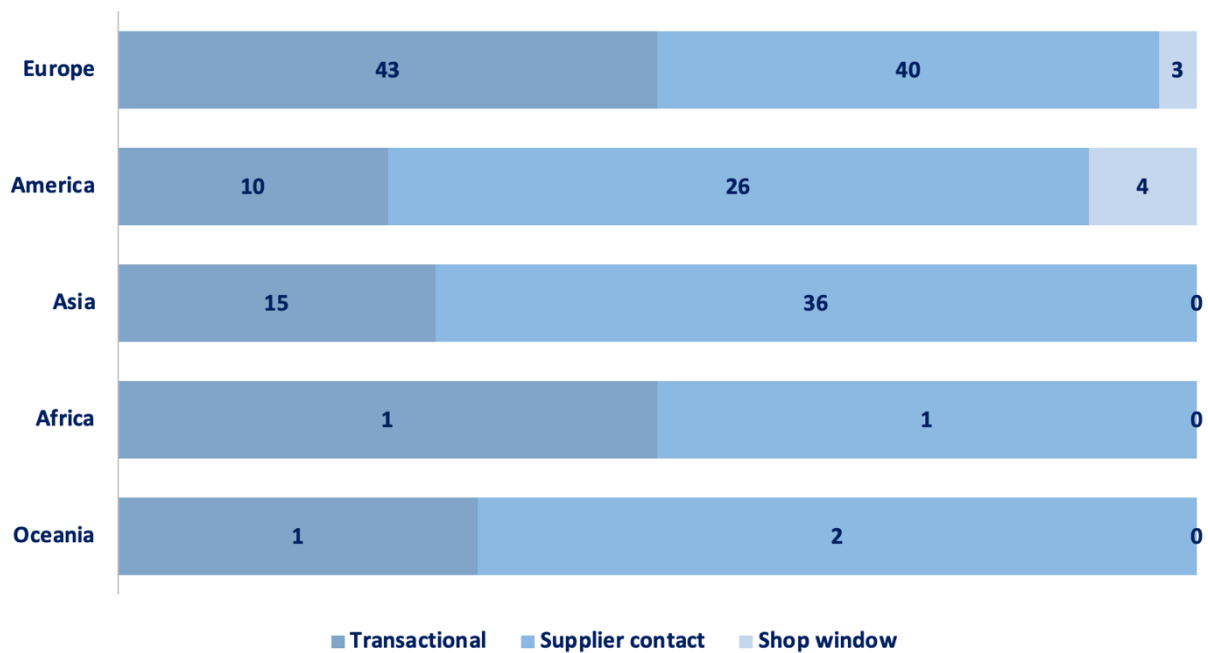


Figure 0.4: marketplace classification in different continents

Finally, the most accepted payment method is the credit card (accepted in 79% on marketplace), while very appreciated result digital wallet (57%). Still largely accepted remain the debit card (45%), while the bank transfer is considered from less than a third of marketplaces. Finally, it results that there are platforms accepting also cryptocurrencies (2%).

## Case studies analysis

The analysis of case studies is based on six interviews done to managers of companies belonging to either automotive or grocery industries: the presence of e-Commerce in these two sectors is very different. Automotive industry is formed from 120.000 firms and presents an e-Commerce penetration rate of 77%, for a value of 98 billions of euro over the 128 total billions. Grocery sector in Italy is very fragmented and composed from 1,5 million of firms that exchange value for 330 billions of euro; here, the e-Commerce presents a penetration rate of 24%, exchanging only 78 billions.

The analysis started with the definition of each case position in the supply chain in order to identify which kind of companies can be the partners, to try to inference the research to the whole supply chain.

Data collected suggests the most used technology is the Electronic Data Interchange, very appreciated from large companies for ordinary exchange of data, but also e-Marketplace and proprietary portal are leveraged for procurement. It is observed that the use of e-Commerce technologies can be strongly associated with the size of the firm, where small companies are usually those that don't leverage on digital systems.

The interviewed managers belong to medium or large companies and recognize the importance of e-Commerce B2b and the related advantages, such as the lower transaction costs or the better inventory management. It emerges also the awareness of how small companies are barriers for the development of the whole supply chain, and some interviewed signal how they are between supplier that pretend EDI and small companies that refuse it, in a position that makes them unable to exploit the technology potentiality but that implies the cost linked to its implementation.

Managers report that small companies that don't use digital communication systems are not only unwilling to invest financial resources, but they result also unstructured

and incapable from organizational point of view, lacking particularly in skilled human resources.

The other main barriers resulted are the lack of common communication standards in the supply chain, which has as a consequence the development and use of translating software, and the lack of a vision that leaves behind the traditional working systems and focuses on the advantage provided by new solutions.

## Conclusion

Observed data evidence the evolution of e-Commerce B2b technologies in Italy, with marketplace that are increasing their importance and EDI that remains the preferred solutions for the exchange of information, probably because EDI was established between firms with the use of VANs before the raise and diffusion of marketplace.

It is largely recognized that e-Commerce is becoming a necessity for both firms and supply chain in order to remain competitive with foreign competitors, but there are still significant barriers. The main difficulty is represented by unstructured firms unwilling to invest in new technologies, but a relevant issue is also the absence of common communication standards that could strongly increase the efficiency of digital technologies.

Consequently, large companies must act as pioneers leveraging on their experiences and bargaining power over small firms: they must encourage the adoption of standards for communication formats, working together with common interests, and must force unstructured companies to adopt new instruments, leading the whole supply chain toward better performances.

The analysis evidence also the lack of vision for future development. Specifically, it emerged that some managers result still unconfident about new technologies and

collaborative practices implementation. A common vision based on collaboration is needed for supply chain future development and for the implementation of innovation.

Finally, limitations of the study are reported, with insights about possible future research. The definition of a better framework can be based on research on EDI and extranet, the other principal e-Commerce technologies in Italy. About e-Marketplace, they are continuously increasing and periodically review should be done to adjust current data. The analysis on case studies result based on few elements and further interviews should be done to cover in a proper way both entire supply chain.



# Introduction

The current world scenario is in continuous evolution and businesses have to adapt themselves to new consumers' needs: improved services, customized experience and faster delivery times. To react, businesses need to improve the quality and efficiency of their processes and of the relationships with partners in the supply chain.

In the last two decades, the Internet technologies lead to the creation of business-to-business e-Commerce: it is a series of systems and networks based on new information and communication technologies that aim at improving processes among firms. The use of these solutions provides several advantages to firms, such as decreased transaction costs, improved procurement process management, increased total efficiency of the company and of the supply chain. On the other hand, e-Commerce technologies implementation implies relevant initial investment and changes in company organizations, which constitute an important barrier for the digital systems diffusion.

The aim of this study is the analysis of the current state of e-Commerce B2b technologies in Italy. The work aims at defining which are the most used systems and how much they are diffused, with a particular attention on companies' perspective.

Specifically, the analysis will start with the search of e-Marketplace, present in the whole world, offering their services to Italian companies. They will be examined and information about several characteristics will be collected, to extract deeper analysis regarding their provenience, their functions and the kind of service offered.

A second analysis will be conducted by interviewing some managers of two specific industries, i.e. the automotive and the grocery one. The interviews allow the access to managers' point of view to understand how they consider e-Commerce technologies and which advantages or issues they have experienced. Moreover, they provide information about the current state of the art of each supply chain and how they imagine will be the future relating to these technologies.

Finally, conclusion will be provided by summarizing the evidence derived from analysis. Limitations of the work and future research will be reported as conclusion.









# 1. Literature review

## 1.1 Methodology of the review

Several information and communication technologies and their implementation in supply chain and business-to-business relationships have been studied thus far by practitioners and researchers. The aim of this literature review is collecting their works and defining a proper contextualization of the phenomena and of its state of the art.

### 1.1.1 Methodology

A three-step methodology has been conducted in the review. Phase 1 consisted of paper collection and selection, while Phase 2 involved a deep analysis of the selected literature. Finally, research gaps and potential areas for further investigation were identified (Phase 3).

#### 1.1.1.1 *Phase 1: paper selection*

Papers selection process included the following stages:

- Definition of the unit of analysis: the unit of analysis was defined as a single scientific paper published in an international peer-reviewed journal.
- Collecting publications: the starting point for the identification of relevant paper was the library database Scopus. The research was conducted using a number of keywords (i.e., “B2b”, “e-commerce”, “marketplace”, “e-supply

chain", "e-procurement", "supply chain collaboration", "EDI", "extranet", "e-sourcing", "e-catalogue", "blockchain", "XML", "automotive", "grocery") and their combinations, used to search in the article title, abstract, or keywords. To avoid the omission of important papers, the selection has taken place basing on the number of cited contributions.

- Delimiting field: to avoid old papers out of context, the research was limited over the last two decades. Moreover, a Scopus filter tool for the subject area was used to limit the research in Business, Management and Accounting area. Finally, to assure the quality and the accuracy of context of the papers, the publication journal was taken into consideration using Scimago Journal Rank indicator.
- Material evaluation: the literature collected was filtered on the base of an analysis of papers abstract, introduction and conclusion.

At the end, the papers collected are 51, but also 3 conference papers were considered important for the final objective of this work.

#### *1.1.1.2 Phase 2: research method*

Papers were classified and evaluated on the basis of the research methodology used. For the identification of different categories, the classification proposed by Meixell and Norbis was used. They identified seven research methods, namely analytical/mathematical models, conceptual models or frameworks, interviews, case studies, surveys, simulations, and others. Overall, more than half papers are based on empirical research (e.g., case studies, interviews, surveys), whereas the others are either conceptual or based on analytical or simulation models, or on a literature review. The reviewed articles are categorized according to the research methods in Table I.

S.no.	Authors (year)	Journal	Title	Research method(s)
1	Nakayama M. (2000)	<i>Journal of Information Technology</i>	<i>E-commerce and firm bargaining power shift in grocery marketing channels: A case of wholesalers' structured document exchanges</i>	Analytical models, surveys
2	Vlosky R.P. et al. (2000)	<i>Journal of Business and Industrial Marketing</i>	<i>Extranets: Impacts on business practices and relationships</i>	Surveys
3	Ahmad S., Schroeder R.G. (2001)	<i>Production and Operations Management</i>	<i>The impact of electronic data interchange on delivery performance</i>	Analytical models, surveys
4	Mentzer J.T. et al. (2001)	<i>Journal of Business Logistics</i>	<i>Defining supply chain management</i>	Others
5	Lin F.-R. et al. (2002)	<i>IEEE Transactions on Engineering Management</i>	<i>Effects of information sharing on supply chain performance in electronic commerce</i>	Simulation
6	Stefansson G. (2002)	<i>International Journal of Production Economics</i>	<i>Business-to-business data sharing: A source for integration of supply chains</i>	Case studies, literature review
7	Johnson M.E., Whang S. (2002)	<i>Production and Operations Management</i>	<i>E-business and supply chain management: An overview and framework</i>	Surveys
8	Davila A. et al. (2003)	<i>European Management Journal</i>	<i>Moving procurement systems to the internet: The adoption and use of e-procurement technology models</i>	Surveys
9	Lee S.C. et al. (2003)	<i>Electronic Commerce Research and Applications</i>	<i>Business value of B2B electronic commerce: The critical role of inter-firm collaboration</i>	Surveys
10	Nurmilaakso J.-M., Kotinurmi P. (2004)	<i>Production Planning and Control</i>	<i>A review of XML-based supply-chain integration</i>	Others

Table I: reviewed articles categorized according to research methods

S.no.	Authors (year)	Journal	Title	Research method(s)
11	Ruppel C. (2004)	<i>Business Process Management Journal</i>	<i>An information systems perspective of supply chain tool compatibility: The roles of technology fit and relationships</i>	Surveys
12	Hawking P. (2004)	<i>Asia Pacific Journal of Marketing and Logistics</i>	<i>E-procurement: Is the ugly duckling actually a swan down under?</i>	Surveys
13	Gunasekaran A., Ngai E.W.T. (2004)	<i>European Journal of Operational Research</i>	<i>Information systems in supply chain integration and management</i>	Others, literature review
14	Soliman K.S., Janz B.D. (2004)	<i>Information and Management</i>	<i>An exploratory study to identify the critical factors affecting the decision to establish Internet-based interorganizational information systems</i>	Analytical models, surveys
15	Bartezzaghi E., Ronchi S. (2005)	<i>Production Planning and Control</i>	<i>E-sourcing in a buyer-operator-seller perspective: Benefits and criticalities</i>	Others
16	Holweg M. et al. (2005)	<i>European Management Journal</i>	<i>Supply chain collaboration: Making sense of the strategy continuum</i>	Others
17	Power D. (2005)	<i>Supply Chain Management</i>	<i>Determinants of business-to-business e-commerce implementation and performance: A structural model</i>	Case studies, surveys
18	Manabe S. (2005)	<i>International Journal of Technology Management</i>	<i>A comparative analysis of EDI integration in US and Japanese automobile suppliers</i>	Interview. surveys
19	Moon (2005)	<i>Journal of Public Procurement</i>	<i>E-procurement management in state governments- Diffusion of e-procurement practices and its determinants</i>	Analytical models, surveys
20	Agi M. et al. (2005)	<i>Journal of Purchasing and Supply Management</i>	<i>"100% EDI-connected suppliers" projects: An empirical investigation of success factors</i>	Surveys
21	Grey W. et al. (2005)	<i>IBM Systems Journal</i>	<i>The role of e-marketplaces in relationship-based supply chains: A survey</i>	Surveys

Table I: reviewed articles categorized according to research methods

S.no.	Authors (year)	Journal	Title	Research method(s)
22	Dai Q., Kauffman R.J. (2006)	<i>Information Technology and Management</i>	<i>To be or not to B2B: Evaluating managerial choices for e-procurement channel adoption</i>	Analytical models
23	Lancaster S. et al. (2006)	<i>Information Management and Computer Security</i>	<i>E-supply chain management: An evaluation of current web initiatives</i>	Case studies
24	Doukidis G.I. et al. (2007)	<i>Supply Chain Management: An International Journal</i>	<i>A conceptual framework for supply chain collaboration: Empirical evidence from the agri-food industry</i>	Case studies
25	Foster T. (2007)	<i>Supply Chain Management</i>	<i>Into the depths of the I-E-I framework: Using the internet to create value in supply-chain relationships</i>	Case studies
26	Pramatari K. (2007)	<i>Supply Chain Management</i>	<i>Collaborative supply chain practices and evolving technological approaches</i>	Case studies
27	Croom S., Brandon-Jones A. (2007)	<i>Journal of Purchasing and Supply Management</i>	<i>Impact of e-procurement: Experiences from implementation in the UK public sector</i>	Interviews
28	Gunasekaran A., Ngai E.W.T. (2008)	<i>International Journal of Production Economics</i>	<i>Adoption of e-procurement in Hong Kong: an empirical research</i>	Conceptual models, surveys
29	Nurmiilaakso J.-M. (2008)	<i>International Journal of Production Economics</i>	<i>Adoption of e-business functions and migration from EDI-based to XML-based e-business frameworks in supply chain integration</i>	Analytical models, surveys
30	Gunasekaran A. et al. (2008)	<i>International Journal of Production Economics</i>	<i>E-Procurement adoption in the Southcoast SMEs</i>	Analytical models, surveys
31	Akyuz G.A., Rehan M. (2009)	<i>International Journal of Production Research</i>	<i>Requirements for forming an e-supply chain</i>	Others

Table I: reviewed articles categorized according to research methods

S.no.	Authors (year)	Journal	Title	Research method(s)
32	Chelariu C., Sangtani V. (2009)	<i>Journal of Business and Industrial Marketing</i>	<i>Relational governance in B2B electronic marketplaces: An updated typology</i>	Conceptual models
33	Rossignoli C. et al. (2009)	<i>Electronic Markets</i>	<i>The strategic mediator: A paradoxical role for a collaborative e-marketplace</i>	Analytical models, case studies
34	Yao Y. et al. (2009)	<i>Management Science</i>	<i>Private network EDI vs. Internet electronic markets: A direct comparison of fulfillment performance</i>	Analytical models
35	Caniato F. et al. (2010)	<i>Benchmarking</i>	<i>Towards full integration: EProcurement implementation stages</i>	Interview
36	Porterfield T.E. et al. (2010)	<i>International Journal of Physical Distribution &amp; Logistics Management</i>	<i>B2B eCommerce: an empirical investigation of information exchange and firm performance</i>	Analytics models
37	Balocco R. et al. (2010)	<i>Industrial Management &amp; Data Systems</i>	<i>B2b eMarketplaces: A classification framework to analyse business models and critical success factors</i>	Case studies
38	Agdas D., Ellis R.D. (2010)	<i>Construction Management and Economics</i>	<i>The potential of XML technology as an answer to the data interchange problems of the construction industry</i>	Case studies
39	Wiengarten F. et al. (2010)	<i>Supply Chain Management</i>	<i>Collaborative supply chain practices and performance: Exploring the key role of information quality</i>	Surveys
40	Perego A., Salgaro A. (2010)	<i>Benchmarking</i>	<i>Assessing the benefits of B2B trade cycle integration: A model in the home appliances industry</i>	Conceptual models
41	Chong W.K. et al. (2011)	<i>Marketing Intelligence and Planning</i>	<i>Development of a business-to-business critical success factors (B2B CSFs) framework for Chinese SMEs</i>	Analytical models, surveys

Table I: reviewed articles categorized according to research methods



S.no.	Authors (year)	Journal	Title	Research method(s)
42	Loukis E. et al. (2011)	<i>Information Systems Management</i>	<i>Barriers to the adoption of B2B e-marketplaces by large enterprises: Lessons learned from the hellenic aerospace industry</i>	Case studies
43	Lau K.H., Sirichoti T. (2012)	<i>International Journal of Information Systems and Supply Chain</i>	<i>A study on RFID adoption in the grocery retailing industry of Thailand</i>	Surveys
44	Wiegarten F. et al. (2013)	<i>International Journal of Operations and Production Management</i>	<i>Investigating the impact of e-business applications on supply chain collaboration in the German automotive industry</i>	Analytical models, surveys
45	Treiblmaier H. (2018)	<i>Supply Chain Management</i>	<i>The impact of the blockchain on the supply chain: a theory-based research framework and a call for action</i>	Conceptual models
46	Okano M.T., Fernandes M.E. (2019)	<i>International Journal of Supply Chain Management</i>	<i>Electronic data interchange (EDI): An interorganizational system applied in the auto parts industry supply chain</i>	Surveys, literature review
47	Wang Y. et al. (2019)	<i>Supply Chain Management</i>	<i>Understanding blockchain technology for future supply chains: a systematic literature review and research agenda</i>	Others
48	Al-Doori J.A. (2019)	<i>Journal of Industrial Engineering and Management</i>	<i>The impact of supply chain collaboration on performance in automotive industry: Empirical evidence</i>	Surveys, literature review
49	Rejeb A. et al. (2021)	<i>International Journal of Logistics Management</i>	<i>Potentials of blockchain technologies for supply chain collaboration: a conceptual framework</i>	Conceptual models
50	Yacoub G., Castillo M. (2021)	<i>Journal of Business Strategy</i>	<i>Blockchain in your grocery basket: trust and traceability as a strategy</i>	Surveys
51	Loro C., Mangiaracina R. (2022)	<i>Industrial Management and Data Systems</i>	<i>The impact of e-marketplace on the B2b relationships</i>	Simulation

Table I: reviewed articles categorized according to research methods

Analyzing the several journals from which papers are taken, the distribution appears heterogeneous. The most consulted journal is the *supply Chain Management* (7 papers), then there is the *International Journal of Production Economics* (4 papers), and, finally, there are a number of journals which provide 2 articles for each, namely *Benchmarking*, *European Management Journal*, *Industrial Management and Data System*, *Journal of Business and Industrial Marketing*, *Journal of Purchasing and Supply Management*, *Production and Operation Management*, *Production Planning and Control*.

The deep analysis of each of these papers allows the understanding of firms' procurement processes, the potential for improvements and related benefits offered by the supply chain collaboration practices and by the new technologies available in the market.

## 1.2 e-Commerce business-to-business (B2b)

About two decades ago, the Internet emerged as an unprecedented and highly disruptive technology that shook the foundations of many established businesses. The diffusion and the high penetration of the Internet in the enterprises and the increasing interest in inter-firm's marketing relationships resulted in the establishment of a big number of Internet-based business-to-business (B2b) systems and networks, based on the new information and communication technologies (ICT). To enhance the efficiency of purchasing and supply management, firms have been gradually adopting information systems and communication networks to automate the major procurement processes (Dai and Kauffman, 2006).

In modern supply chain, business transactions can be extraordinarily complex. Multiple firms, each with unique and competing objectives, must coordinate production processes to respond to rapidly shifting patterns in customer demand.

Although information sharing benefits overall supply chain performance, in many cases the misaligned interests and incentives of supply chain partners prevent the full flow of information. Firms can use a variety of mechanisms, widely discussed in the supply chain literature, to align incentives, balance demand and supply, and facilitate information flows with their trading partners.

## 1.3 Supply Chain

### 1.3.1 Definitions and framework

The supply chain is the network of organizations, people, activities, information and resources involved in supplying a product or service to a consumer. Several supply chain's definitions can be found in existing literature:

- Supply chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer (Christopher, 1992);
- Supply chain is defined as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer (Mentzer et al., 2001);
- Supply chain is an integrated system wherein a number of business entities such as suppliers, manufacturers, distributors, and retailers work together to deliver goods and/or services promptly at a competitive price (Ahmad S. and Schroeder R.G., 2001);
- Supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials

into intermediate and finished products, and the distribution of these finished products to customers (Akyuz and Rehan, 2009);

- Supply chain is a bidirectional flow of information, products and money between the initial suppliers and final customers through different organizations (Nurmilaakso, 2008).

Nowadays, supply chain's topic has acquired great importance because the context in which companies operate has changed a lot in the last decades: business actors have to face with an increased competition, globalization, several technological changes, and more demanding customers. Mentzer et al. (2001) have identified three main trends that explain the great importance acquired by supply chain concept:

- Global sourcing: globalization of supply has forced companies to look for more effective ways to coordinate the flow of materials into and out of the company;
- Emphasis on time and quality-based competition: getting a defect-free product to the customer faster and more reliably than the competition is no longer seen as a competitive advantage. Customers are demanding products consistently delivered faster, exactly on time, and with no damage;
- Greater environmental uncertainty: it's a consequence of the global orientation and increased performance-based competition, combined with rapidly changing technology and economic conditions. This uncertainty requires greater flexibility on the part of individual companies and supply chain.

In many cases, the ability of companies to compete with competitors has been directly linked to their ability to collaborate with other enterprises (Matopoulos, Manos et al., 2007). On the base of these trends and on the several developments occurred in information technology, more and more transactions are performed on the Internet and is becoming critical for the firms to rely on "web-based supply chain" or "e-supply chain".

### 1.3.2 E-Supply Chain

Flexibility, adaptation and responsiveness are critical success factors in today's digital economy. In e-supply chain, efficiency and effectiveness of the overall supply chain is increased via web-based connectivity of inter-organizational information system (Viswanadham et al., 2006). In Luo et al. (2001), an e-supply chain is defined as an emerging business strategy that incorporates the power of e-commerce to streamline the manufacturing processes, speed the product cycles, and integrate the supply chain and better response to customers.

The Internet is the greatest ICT tool and integration is the key to efficiency and success: e-supply chains take advantage of the Internet to obtain better integration over the supply chain. Therefore, the reasons for forming e-supply chains are as follow (Akyuz and Rehan, 2009):

- Effectively leveraging web to redesign, automate and integrate all business functions;
- Seamless coupling to the entire supply chain via the web, with strong internal as well as external integration;
- Online, real-time collaboration and synchronization via the web.

## 1.4 e-Procurement

Traditionally, procurement has leveraged on a number of different communication instruments to facilitate the procurement processes between the various parties. These have included the use of mail, phone, fax, EDI, and, more recently, email and the Internet. E-procurement is the evolution of those systems: it exploits electronic technologies to streamline and enable the procurement activities of an organization.

### 1.4.1 e-Procurement definitions

E-procurement has been widely discussed and a number of different definitions could be found in existing literature.

Johnson M.E. and Whang (2002) state that e-procurement allows companies to use the internet for procuring direct or indirect materials, as well as handling value added services like transportation, warehousing, customs clearing, payment, quality validation, and documentation.

Davila et al. (2003) define an e-procurement technology as any technology designed to facilitate the acquisition of goods by a commercial or a government organization over the internet. E-procurement technologies – including e-procurement software, B2b market exchanges, and purchasing consortia – are focused on automating workflows, consolidating and leveraging organizational spending power, and identifying new sourcing opportunities through the Internet.

Croom and Brandon-Jones (2007) explain e-procurement as the use of integrated information technology systems for procurement functions, including sourcing, negotiation, ordering, receipt and post-purchase review.

Moon (2005) define e-procurement as a comprehensive process in which organizations use IT system to establish agreements for the acquisition of products or services (contracting) or purchase product or services in exchange for payment (purchasing). E-procurement employs various elements, including electronic ordering, Internet bidding, purchasing cards, reverse auctions, and integrated automatic procurement systems.

E-procurement could be divided in two main processes: e-Sourcing, which refers to the tools supporting the search for new suppliers, the definition of their status, the online negotiation through electronic auctions, and request for proposal or request for

quotes, and e-Catalog, which is the recursive buying process of products and services, usually based on web catalogues, when the trade conditions have already been agreed upon (Balocco et al., 2010).

Bartezzaghi and Ronchi (2005) define e-Sourcing as a practice that entails the whole process of requirements definition, suppliers scouting and qualification, request for bid and final negotiation and selection carried out by an industrial customer.

A classification of e-procurement ways of using the Internet is provided also from Gunasekaran et al. (2009):

- company web site with catalogs of products, perhaps with online purchase;
- aid agency web sites with tenders inviting company bids via online forms or emails;
- web portals or exchanges that create markets by bringing buyers, sellers or both together;
- circulating information by email to potential buyers or suppliers.

#### 1.4.2 e-Procurement potential benefits

Proponents of e-procurement argue that it helps companies save money and provides a more accountable, more effective and faster way to manage procurement.

Caniato, Golini, Luzzini and Ronchi (2010) argue that benefits brought by an e-procurement system can have a twofold nature. From an economical perspective, e-procurement implies an increased efficiency in the organizational structure, especially in the reduction of purchasing department size and levels and of the number of functional areas involved in the purchasing process. This means that the process becomes faster, flexible and more agile; costs are lower and service to final customers higher. Other savings are generated by the reduction of transaction and administrative

cost, of clerical work, of purchasing cycle time. Finally, e-procurement allows efficiency improvements in terms of productivity and purchasing process quality and accuracy. From an organizational perspective, the organizational benefits regard: increased control on the spending, transparency in the relationship with suppliers, decentralization of procurement activities and supply base rationalization.

According to Gunasekaran et al. (2009) the benefits can be grouped under three categories: strategic, including organizational changes and market advantage; high leverage opportunities, such as improved relationships with existing suppliers and exploring relationships with new suppliers; operational, like more efficient purchasing.

Moon (2005) mention a list of potential benefits of e-procurement: lowered transaction costs; faster ordering; wider vendor choices; standardized, more efficient procurement processes; greater control over procurement spending and better employee compliance; more accessible Internet alternatives for buyers; less paperwork and fewer repetitious administrative procedures; reengineered procurement workflows.

Estimations about the advantages related to the use of e-procurement technologies suggest that companies report savings of 42 per cent in purchasing transaction costs. This cost reduction is associated with less paperwork, which translates into fewer mistakes and a more efficient purchasing process. The simplification of purchasing process implies a favorable impact on the purchasing cycle time: while not directly quantifiable into dollars, faster cycle time provides increased flexibility and more up-to-date information at the time of placing a purchasing order. E-procurement technologies users also report a reduction in the number of suppliers, with the consequent associated cost benefits of lower managerial complexity, lower prices, and a headcount reduction in purchasing process (Davila et al., 2003).



### 1.4.3 Barriers for e-procurement implementation

E-procurement adoption is strictly linked to a number of difficulties and barriers that companies face during implementation process. Adoption issues have two main dimensions: behavioral control, since they are interdependent with behavior issues, including things such as perceived understanding of the benefits and barriers, and process control, which include things such as critical success factor and performance assessment of the adoption (Gunasekaran et al., 2008).

Risks associated to e-procurement adoption are different in nature (Davila et al., 2003):

- Internal business risks: companies are uncertain about whether they have the appropriate resources to successfully implement an e-procurement solution;
- External business risks: cooperation with external suppliers or customers is necessary and successful implementation depends also from partners implementation and capacity in exploiting e-procurement;
- Technology risks: companies fear the lack of a widely accepted standard which could block the integration of different e-procurement software across the supply chain;
- E-procurement process risks: related to the security and control of the e-procurement process itself.

Basing on empirical research conducted in Australia, Hawking et al. (2004) have identified in detail several barriers against the adoption of e-procurement: security of transaction, lack of supplier e-procurement solutions, high cost of technology, lack of a legal framework, lack of technical expertise, lack of e-procurement knowledge, no real business benefit being identified, lack of data exchange standards, and lack of business relationships with suppliers.

## 1.5 E-Supply Chain Execution

### 1.5.1 Definitions

The following step towards the supply chain integration among companies is the e-supply chain execution. The e-supply chain execution is the integration and digitalization of the order-to-payment cycle, including logistics and administrative activities (Balocco, Perego et al., 2010) and, more generally, of the trade process. The order-to-payment cycle consist in the creation, exchange and processing of documents in a commercial transaction by trade partners. Specifically, it concerns the processes like purchase orders, order confirmations, delivery notes, notification of acceptance of goods, invoices, credit/debit notes, notifications of payment.

Therefore, e-supply chain execution is whatever technological solution that supports one of the following phases (Bartelé, Rangone et al., 2004):

- Pre-sales support: consist in the sharing of all relevant information (products, prices, availability, terms of delivery) needed in the subsequent phase of order issuing;
- Order issuing: from the order creation to the confirmation of economics and logistic conditions by the supplier;
- Logistics: handling, picking and delivery of goods to customer hub;
- Administrative and accounting cycle: starts from invoice activity and ends with the payment process;
- After-sales support: set of activities such as complaint management, management of technical support requests and sharing of account information.

### 1.5.2 Benefits

The integration of order-to-payment cycle between companies have always been recognized as a source of efficiency and effectiveness in business processes (Perego and Salgaro, 2010). According to Dearing (1990) classification, achievable improvements can be divided into strategic and operational benefits. Strategic benefits can be summarized as a better relationship with trade partners resulting in long-lasting relationships and an increase in information flows. Meanwhile, operational benefits can be broken down into four classes (Perego and Salgaro, 2010):

- I. Reduction in the execution costs of interface activities, as a result of an increase in workforce productivity and a reduction in the cost of expendable materials (Bertelé, Rangone et al., 2004; Perego and Salgaro, 2010). By using integration technologies to automate document management activities, human intervention is necessary only to control activities and manage exceptions (Perego and Salgaro, 2010);
- II. Improvement in process accuracy, primarily as a result of the elimination or drastic reduction of tasks with a very high manual component and the consequent reduction in the costs of management of non-conformity issues (Perego and Salgaro, 2010);
- III. Reduction in the space occupied to archive fiscal documentation (Perego and Salgaro, 2010);
- IV. Cut-back in process execution (or cycle) times with the simplification of activities and the possibility to control processes using a workflow logic (Perego and Salgaro, 2010).

According to (Bertelé, Rangone et al., 2004), a relevant benefit is the improvement of service level perceived from customers: specifically, lower processing time for request and increased accuracy in the process are appreciated from clients.

## 1.6 E-Supply Chain Collaboration

### 1.6.1 Definitions and framework

As companies evolve in their connectivity and integration efforts, the ability of supply chain partners to engage in collaborative planning and joint management of critical business activities become the key to efficiency, effectiveness and success of the overall supply chain (Akyuz and Rehan, 2009). Many writers have recognized this increased need for collaboration, stressing out the establishment of closer and long-term working relationships even partnerships with suppliers at various levels in the chain, as a way to construct ever more efficient and responsive supply chains, in order to deliver exceptional value to customers (Matopoulos et al., 2007). The concept of collaboration has altered the traditional relationship between suppliers and manufacturers from one of “haggling and hedging bets on product orders” to a mutually beneficial model that holds promise to improve the competitive position of all parties involved (Ruppel, 2004).

Therefore, an e-Supply Chain Collaboration can be defined as the collaborative activities between buyers and suppliers, including production and procurement planning (i.e., vendor management inventory and collaborative planning, forecasting, and replenishment), new product development, supply chain monitoring, and control (Balocco, Perego et al., 2010; Bartezzaghi and Ronchi, 2005). Pramatarì (2007) suggests that supply chain collaboration occurs when two or more companies share the

responsibility of exchanging common planning, management, execution, and performance measurement information.

Matopoulos et al. (2007) have proposed a general research framework for the study of supply chain collaboration. Specifically, two pillars are distinguished: dealing with the design and the government of supply chain activities, and the establishment and the maintenance of supply chain relationships.

The first pillar in the framework is related to the design and government of supply chain activities consisting of three elements. The first element is about taking the decision of selecting the appropriate partner, not all of them can become close collaborators and a selection is needed, based on the expectations, perceived benefits and drawbacks, and the “business fit” of companies (Matopoulos et al., 2007). The second element involves selecting the activities on which collaboration will be established since not all the activities require the same amount of involvement and close relationship. The plethora of the activities constitutes the “width” of collaboration (Sahay, 2003; Matopoulos et al., 2007). After selecting the activities, the third element is to identify in what level (depth) companies will collaborate: strategic, tactical, operational (Fawcett and Magnan, 2002; Matopoulos et al., 2007). Finally, another important element for the design and governing of supply chain activities includes the decision of selecting the appropriate technique and technology to facilitate information sharing (Matopoulos et al., 2007).

The second pillar concerns the establishment and maintenance of supply chain relationships, based on mutuality of benefits and risk and rewards sharing. The balance between risk and reward will be one of the crucial factors for collaboration, but also other elements such as trust (La Londe, 2002), power (Cox et al., 2003) and dependence have been identified as influential factors in companies’ decision to collaborate (Matopoulos et al., 2007).

### 1.6.2 Phases influenced from collaboration

To better understand the value creation process through e-supply chain collaboration, it is useful to show which are the more relevant phases impacted by this approach (Bertelé, Rangone et al., 2004):

- Monitoring and control of supply chain, from the sharing of information (sales data, availability of production capacity, etc.) and KPIs, to the reporting of supply chain critical events;
- Collaboration about planning activities, from demand forecasting, to promotion and the stock management (Bertelé, Rangone et al., 2004). The main functionalities that support these processes are (Matopoulos et al., 2007):
  - Inventory management;
  - Manufacturing planning;
  - Order processing;
- Collaboration about new products development (Matopoulos et al., 2007; Bertelé et al., 2004), sharing of the main technical documents and managing project workflow;
- Collaboration about communication and marketing processes. It goes from sharing key information (on products and prices, phase-in and phase-out plans, etc.) to the management of customer relationship and customer service (Matopoulos et al., 2007).

Specifically, supply chain collaboration has taken the form of specific practices (Pramatari, 2007): continuous replenishment program (CRP), vendor management inventory (VMI), collaborative planning, forecasting and replenishment (CPFR). VMI is a technique whereby the manufacturer (supplier) has the sole responsibility for managing the customer's inventory policy, including the replenishment process, based

on the variation of stock level in the customer's main warehouse or distribution center (Blatherwick, 1998; Holweg et al., 2005; Pramadari, 2007). CRP move one step ahead of VMI and reveals demand from the retailers' stores. The inventory policy is then based on the sales forecast, built from historical demand data and no longer purely based on the variations of inventory levels at the customers' main stock-holding facility (Andraski, 1994; Pramadari, 2007). Collaborative planning, forecasting and replenishment can be seen as an evolution from VMI and CRP, addressing not only replenishment but also joint demand forecasting and promotions planning, focusing on promotions and special-line items. CPFR is based on extended information sharing between retailer and supplier, including point-of-sales data, forecasts and promotion plans (Pramadari, 2007).

### 1.6.3 Benefits

According to existing literature, there are multiple benefits that can be achievable through supply chain collaboration. In particular, Holweg et al. (2005) recognizes the following benefits:

- Improvement in service level;
- Reduction in inventories;
- Reduction of obsolescence risk;
- Elimination of the bullwhip effect by linking the inventory and replenishment decisions;
- Better utilization of production capacity as the extended visibility of the supply chain provides a certain additional flexibility to prioritize or delay customer replenishment without compromising service levels, thereby reducing the need for capacity buffers;

- Better utilization of transportation resources, because shared information allows for better load consolidation;
- Control the risk for constrained components or materials.

In Table II, Matopoulos et al. (2007) links supply chain activities to specific collaboration benefits:

<b>Supply chain activities</b>	<b>Collaboration benefits</b>
Procurement	<ul style="list-style-type: none"> <li>- Less time searching for new suppliers and tendering</li> <li>- Easier management of a reduced supply base</li> <li>- More stable prices</li> </ul>
Inventory management	<ul style="list-style-type: none"> <li>- Lower stocks holdings</li> <li>- Increased asset utilization</li> </ul>
Product design & New product development	<ul style="list-style-type: none"> <li>- Faster product development</li> <li>- Knowledge sharing &amp; increased innovation capacity</li> <li>- Better quality following from involvement of supplier in design</li> </ul>
Manufacturing (planning)	<ul style="list-style-type: none"> <li>- Increased product quality</li> <li>- Minimize supply disruptions</li> </ul>
Order processing	<ul style="list-style-type: none"> <li>- Increased responsiveness</li> </ul>
Distribution	<ul style="list-style-type: none"> <li>- Faster delivery</li> <li>- Flexible delivery</li> </ul>
Sales	<ul style="list-style-type: none"> <li>- Rapid access to markets</li> <li>- Increased market share</li> <li>- Improved promotional events</li> </ul>
Demand management	<ul style="list-style-type: none"> <li>- More accurate forecasts</li> <li>- Joint resolution of forecast exceptions</li> </ul>
Customer Service	<ul style="list-style-type: none"> <li>- Improved product availability</li> <li>- Improvements in lead times</li> </ul>

Table II: supply chain activities and relative benefits derived from collaboration (Matopoulos et al., 2007)



## 1.7 IT technologies for supply chain management

In today's business environment, most organizations are facing significant pressure to make their operational, tactical, and strategic processes more efficient and effective. Managing the procurement of supplies is an important activity in support of a firm's overall efforts to both control purchasing process expenses and lay a foundation for the competitive product prices. To enhance the efficiency of purchasing and supply management, firms have been gradually adopting information system and communication networks to automate the major procurement processes (Dai et al., 2006). By using more advanced technology and data sharing, one can increase the resource utilization and this reduce costs. Development in information and communication technology has made it possible to integrate the supply chains so that the links between suppliers, producers, customers and third parties have been easier to establish (Stefansson, 2002). Companies are increasingly searching for adopting the right form of interorganizational system (IOS). An IOS is defined as an automated information system shared by two or more companies, it is built around information technology that facilitates the creation, storage, transformation, and transmission of information (Yao et al., 2009). Establishing electronic links with their suppliers and customers enables companies to transmit and receive purchase orders, invoices and shipping notifications with much shorter lead times than previously, which gives potential to speed up the entire shipping transaction. The elementary factor in making these links feasible is that the companies must develop the information systems in accordance with standards and communication technology that the other parties can agree to (Stefansson, 2002).

### 1.7.1 E-business framework

Although many differences between business partners are inevitable, standards can bring order by reducing the complexity and uncertainty. Standardization of business documents, business processes and messaging leads to harmonization of meanings for terms, modes of operations and messaging interfaces. An e-business framework is a standard for information sharing within and between companies that enables the exchange of standardized data (Nurmilaakso, 2008). Companies can more easily use different information systems as long as they use the same e-business frameworks in the same way.

The e-business frameworks specify business documents, business processes and messaging for exchange of standardized data (Nurmilaakso, 2008):

- For business documents, the e-business framework specifies the data structures, data elements and their meaning in business documents;
- For business processes, the e-business framework can specify the exchange of business documents;
- For messaging, the e-business framework can define the transportation, packing and security standards to be used in the exchange of business documents in the business processes.

Moreover, an e-business framework always has a certain scope: a cross-industry e-business framework aims to cover all industries, whereas an industry-specific e-business framework focuses on one or few industries (Nurmilaakso, 2008).

## 1.7.2 Electronic Data Interchange (EDI)

### 1.7.2.1 *Definition*

One of the earliest types of e-business framework is Electronic Data Interchange (EDI). EDI is an application-to-application (A2A) technology to exchange data, which allow a direct interaction between ERPs of companies. A2A technology solutions imply a limited human intervention on the B2b system and people have typically a role of supervision and control of the exchanged information flows (Bertelé et al., 2004).

A number of EDI definitions can be found in literature, some of them are reported as follow. Agdas and Ellis (2010) define EDI system as seamless data interchange tools that enable communication between independent, computerized systems by using internationally recognized standards. Power (2005) defines EDI as the direct computer-to-computer exchange between trading partners of agreed and structured business documents such as purchase orders, invoices, consignment notes, remittance advice and customs documents. Following Okano et al. (2019), electronic data interchange is a form of inter-organizational electronic commerce where one trading partner (a buyer or a seller) establishes individual links with one or more trading partners through a computer-to-computer electronic communication method. EDI is a strategy of cooperation between suppliers, distributors and retailers (Okano et al., 2019).

### 1.7.2.2 *Objectives*

Electronic data interchange is of fundamental importance as it allows computers from different organizations to exchange information automatically, a function that is indispensable for the integration of any automated systems. EDI performs an important part in improving organizational communication among the industry supply chain (Okano et al., 2019). The functions of EDI systems ranged from simple

order entry and invoicing, to product promotion, document and data sharing, joint product development and even process knowledge transfer (Dai et al., 2006). Yao et al. (2009) use the concepts of information discovery and transaction processing to explain the functions of this kind of systems: EDI belong to the second category, where transaction processing refers to the execution of transactions through the exchange of appropriate documents and remittances between buyers and suppliers.

### *1.7.2.3 Benefits*

Several studies that state the advantage and benefit derived from EDI systems implementation are available in literature.

First, through EDI, companies can reduce handling costs, thanks to reduction in data entry errors (Ahmad and Schroeder, 2001; Okano et al., 2019), reduction in the volume of paper transactions (Okano et al., 2019) and lower duplication of tasks (Gunasekaran, 2009). Secondly, companies can reduce logistic costs, specifically transaction costs (Gunasekaran, 2009). Analyzing logistic operations, EDI facilitates the implementation of just-in-time shipments leading to significantly lower shipments errors (Davila et al., 2003; Yao et al., 2009). Its use contributes to higher inventory turnover (Ahmad and Schroeder, 2001; Yao et al., 2009), lower obsolescence costs (Yao et al., 2009), waste elimination (Agdas and Ellis, 2010) and lower transportation costs (Yao et al., 2009). A general reduction of costs is confirmed by Croom et al. (2007), which estimates a reduction in the total acquisition costs, with lower prices from suppliers and reduced costs in the requisition-to-payment process. EDI bring improvement in the entire process reengineering the procurement workflows (Gunasekaran, 2009), in a way that streamlines the communication (Gunasekaran, 2009; Agdas and Ellis, 2010) and enables companies to better manage and control production using continuous replenishment (Okano et al., 2019). It results in a more efficient purchasing process (Davila et al., 2003).

EDI solutions have also a positive impact on trading partner relationships (Ahmad and Schroeder, 2001): the benefits provided in terms of lower inventory levels and reduced stockouts have consequence on the entire supply chain, with positive impact also on partner firms (Yao et al., 2009). Okano et al. (2019) also report improved relationships between companies and their suppliers, due to extended data sharing, reduced lead time, and improved communication.

Thanks to EDI systems, customers' satisfaction increase. EDI implies lower prices (Davila et al., 2003), better customer service (Okano et al., 2019) and better responsiveness to customers (Ahmad and Schroeder, 2001). Customer service can be improved by improving access to information and shortening the connection time; through EDI, orders can be processed quickly and scheduled deliveries precisely (Okano et al., 2019).

It's a common idea that the implementation of EDI solutions can improve the competitiveness of a firm by proving a strategic advantage over competitors (Agdas and Ellis, 2010).

#### *1.7.2.4 Barriers*

Although EDI implies several benefits that can strongly improve the competitiveness of a firm, it presents some drawbacks that can limit the implementation. EDI implementation has been identified in the literature as being both costly and complex to implement (Power, 2005). EDI involves costs, such as: dedicated lines or VANs, hiring of specialized companies that provide the communication infrastructure, computer equipment, and integration with existing systems; that is, the deployment of this technology represents a significant burden (Okano et al., 2019). The cost of implementing EDI communication technology, and the cost of installation and maintenance of value-added-networks (VANs), place electronic communication out of

reach for many small and medium enterprises (Stefansson, 2002; Dai et al., 2006). Nurmilaakso et al. (2004) defines EDI as costly and rigid, which expensiveness and inflexibility have limited its adoption in large enterprises and acted as an effective barrier to implementation by small and medium enterprises.

#### 1.7.2.5 *Technologies for EDI*

Traditional EDI system contains two major components: EDI translation software that converts and maps EDI formats to/from internal business application, and communication channels that deliver EDI documents to the desired trading partners (Fu et al., 1999).

The translation software is necessary to encode the message, from whatever format in EDI language, and thereafter adjust and package it for the exchange through the communication channel. Furthermore, the software carries out the inverse activity of decoding. A key requirement of EDI translation software is the ability to integrate the incoming EDI formats with internal business applications. Specifically, EDI translation software converts the internal proprietary format to the one that conforms to a standard acceptable to the trading partners; conversely, it maps incoming standard formats into the proprietary formats recognized by internal business applications (Fu et al., 1999).

The second pillar of EDI integration systems is the communication channel. The choose of the best solution for a company is based on its necessity in terms of straightforwardness and security. Fu et al. (1999) identified principal communication channels:

- Point-to-point private direct link networks: are the most straightforward communication method. They allow a company to dial up and connect directly to partners' computers. They are the best solution for large companies that need

to transmit huge amounts of data daily: they result the most cost-effective alternative for transmitting high volumes of data. They allow the direct interconnection of a small number of users exploiting a tailor-made private protocol: this solution has a low level of scalability (Fu et al., 1999).

- Hub & Spoke private or proprietary networks: they are closed network, usually provided by a hub company, that are available only to the trading partners (the spokes). The hub company is responsible for the protocol conversion and the administrative overheads and provides technical support to both itself and the spokes: the trading partners can access the network without conversion. This type of network is limited and is only available to those trading partners that have a close relationship (Fu et al., 1999). This network model is used mainly from companies which work with e-supply chain execution solutions based on EDI, and from companies that do business with third-parties solutions specialized on e-procurement (Bertelé et al., 2004).
- Value Added Network (VANs): they play the intermediary role by offering a set of added value services which allow the transmission of reliable documents in a safe environment. VANs provide several value-added services to support EDI, like mail boxing, standard conversion, protocol conversion, reliability, security, implementation assistance, administration.
- Public networks (internet): the Internet is a ubiquitous public network that gives the opportunity to transfer data without the necessity to build a dedicated private network. Nevertheless, public networks do not guarantee the same safety level of VAN's networks, which are open only to partners.

#### 1.7.2.5.1 EDI on value-added-networks (VANs)

Before the Internet, the main data transfer between parties was provided through value added networks (VANs). These networks provide virtual spaces for information

to be stored and transmitted, but the translation of various documents written in different standards in comparable formats and the security need to have automated data interchange. All the functionality with the VAN services comes with major implementation and operation costs (Agdas and Ellis, 2010). The result is that the use of EDI through VANs is costly, require specialized workers and advanced infrastructures. Nevertheless, the several benefits derived from EDI solutions can justify its implementation for large companies that transmit huge amount of data daily, since it enables business-to-business procurement processes bringing not only strategic, but also operational benefits.

### 1.7.3 The Internet

The main barrier in benefiting from an implementation of an EDI communication system has been recognized to be the high implementation costs, which imply the limited diffusion of the technology. The advent of the Internet opens up new perspective, especially for small and medium enterprises. The internet provides a new technology for doing EDI: companies of all sizes can communicate with each other electronically through the public Internet, networks for company use only (Intranets) or for use by a company and its business partners (Extranets) (Stefansson, 2002). The Internet offer the possibility to overcome most of the limits of the traditional EDI, improving companies' performances both on the efficiency and effectiveness side. The Internet have two main potentialities: lower connection costs and simpler solutions that would not require standard definition (Bertelé et al., 2004).

The rapid take-off of the Internet and the exponential growth in its use are mainly due to some factors (Stefansson, 2002): public domain code and protocol specification; large heterogeneous installation base, providing users with ability to browse data independent of the computing equipment used; ease of use; good browsing



capabilities; availability of inter-protocol gateways, making it compatible with many other existing protocols.

#### 1.7.3.1 *Internet EDI*

Many organizations have been leveraging the open nature of the Internet to improve their agility and competitiveness: one viable alternative is to deploy EDI via the Internet network. Internet EDI is a set of reliable, accurate, and low-cost techniques, tools and services, which allow an organization to conduct business with its partners via the Internet (Shang et al., 2005). Nowadays, companies can more easily use different information system as long as they use the same e-business frameworks in the same way, so it is clear that EDI is no longer limited to the VANs but it can also be implemented over the Internet (Nurmilaakso, 2008).

Shang et al. (2005) have identified four different major aspects that distinguish Internet EDI from traditional one:

- **Communication protocols:** traditional EDI is proprietary and is designed to support limited proprietary protocols at one time; in contrast, Internet EDI works over the TCP/IP protocol, which is a public standard opened for the use of everyone. Moreover, Internet EDI allows business partners to connect instantly, regardless of their differences in backend systems. Thus, a much lesser degree of configuration is needed for Internet EDI.
- **Deployment cost:** the main reason for non-adopting traditional EDI systems is the high implementation cost, which includes purchasing EDI software, customizing EDI by developing conversion software, integrating EDI with the existing information systems, and establishing the data communication and networking infrastructure with business partners. Internet EDI adopts an open

networking infrastructure: it has a higher flexibility and scalability than traditional EDI without adding additional cost.

- **Efficiency and reliability:** traditional EDI networks have a higher degree of reliability because users can demand VAN to provide certain quality of service level. The network traffic is regulated and its growth is managed: the result is that users can have a guaranteed bandwidth and protection to access the traditional EDI. In contrast, Internet EDI can present some problems in terms of efficiency and reliability. Specifically, it's not possible to predict traffic on the Internet, so it is possible Internet EDI slows or terminates in the process of a transaction. Moreover, Internet EDI needs a mechanism for IP security and networking management, in order to monitor, detect and correct potential problems.
- **Security:** Internet EDI is potentially less secure than traditional EDI, because the network is public and transaction activities are highly distributed among users. When the information is sent, there is little control over the traveling path, and confidential information may be intercepted between the sender and recipient.

#### 1.7.3.2 *Web EDI*

The Web EDI can be considered a second development of the traditional EDI enabled by the emergence of Internet networks. Traditional EDI is not convenient for small and medium enterprises, and also large companies have been hesitant about its adoption, due to high implementation costs. In contrast, Web EDI is a solution that do not require huge expense and perfectly fit the needs of those suppliers whose commercial exchanges with the buyer are very limited in volume and which do not yet have any EDI system installed: the buyers could push them to adopt the Web-based EDI system. In particular, some service providers have developed the Web-based EDI technology enabling trading partners to exchange EDI messages through the Internet. To use the

Web-based EDI technology, suppliers do not need more than a personal computer equipped with an internet browser and a web connection (Agi et al., 2005). In some industries, there are Web-based EDI solutions aimed at attracting small and medium enterprises, which don't have the possibility to do huge investments for the implementation of traditional EDI. In some cases, they address also large companies which are not interested in investing in EDI solutions, due to organizational and integrative reasons (Bertelé et al., 2004). The development of Web-based EDI systems was expected to increase considerably EDI adoption and use due to the low investment that these systems require (Agi et al., 2005).

#### 1.7.3.3 XML

The XML standard 1.0 was introduced in 1998 and was designed to improve the functionality of the Internet by providing flexible information structuring (Nurmilaakso et al., 2004). It provides methods that make data interchange among incompatible platforms possible. Because the language is extensible, it is easy to customize to fit specific purposes while the documents produced are still structured to be identified by more comprehensive standards. Moreover, XML files are easy to be transferred electronically (Agdas and Ellis, 2010). XML has been regarded as more flexible and less expensive to implement and use than EDI (Nurmilaakso, 2008).

XML technologies provides tools to improve the traditional data interchange tools and can be instrumental in achieving integral and responsive supply chains. Reduced administrative effort, improved data processing time, reduced erroneous data entries and elimination of data rekeying are benefits linked to these technologies (Agdas and Ellis, 2010).

### 1.7.4 Extranet

In line with the increasing diffusion of Internet networks, the ways in which companies explain the technology to gain a competitive advantage also increase. The main drawback of Internet networks is their openness, with the consequent security risks associated.

Extranet is a network system that try to address the security issues of the Internet without losing the associated benefits. Foster (2007) explain that an extranet represents a “bridge” between the public internet site and the corporate (internal) intranet site as a means for linking an organization with its suppliers and customers.

#### 1.7.4.1 *Definition and framework*

In literature there are several Extranet definitions, nevertheless most of them are reflected in the one reported by Kallioranta and Vlosky (2004): “an extranet is a private network that uses the Internet protocol and public telecommunication systems to securely share business information with suppliers, vendors, partners, customers, or other businesses”. It is considered as another form of Internet-based B2b e-commerce that utilizes another technology-based approach (Dai and Kauffman, 2006).

Ling and Yen (2001) distinguish four important characteristics of an extranet:

- It's a part of the World Wide Web, or at least based on the major Internet protocols and backbones;
- It's private in contrast to the Internet, and is public compared to an intranet;
- It's mainly for business-to-business information sharing and access;
- It must provide means for security and access-control.

Extranets are flexible, scalable, extensible, and able to integrate across distributed, and heterogeneous system environments and platforms (Kallioranta and Vlosky, 2004).

#### 1.7.4.1.1 Differences with Internet and Intranet

Foster (2007) defines Extranet as a bridge between the Internet and Intranet. Vlosky et al. (2000) defines Internet and Intranet as the two major components of an Extranet.

The Internet is a worldwide network of networks that use TCP/IP communication protocol and share a common address space. It is a public network accessed by general users (Lin et al., 2002).

Intranet is a private network set up within an organization: information is proprietary and only available for members within the organization (Vlosky et al., 2000; Lin et al., 2002). Its primary use is based on internal information retrieval, sharing and management, communication and collaboration, and access to databases and applications. An organization uses intranets to empower its employees by providing an any-to-any connectivity in an organizational network. They add to the list of potential uses by including access to research seminars, company announcements, an employee directory, benefits, and administrative help (Foster, 2007).

#### 1.7.4.2 Objectives

An extranet should allow for the secure collaboration and communication between producers, suppliers, distributors, and customers who are separated by distance or circumstances, resulting in improved marketing decision-making (Foster, 2007). Vlosky et al. (2000) explain that an extranet adds value by allowing firms to share information and data with selected suppliers, partners, and customers, as well as reduce operating costs, savings in time and resources, improvements in customer service, and better relationships in the supply chain. Extranets can extend key information to business partners throughout the supply chain and facilitate collaborative relationships with business partners separated geographically (Kallioranta and Vlosky, 2004). Extranets can also be used in automating supply

chains, placing orders, receiving invoices, tracking shipments, processing payments, developing new products jointly, and transforming business processes (Vlosky et al., 2000; Ling and Yen, 2001). Using an extranet solution does not require high IT competence, because it is based on the Internet connection (Vlosky et al., 2000). Extranets are based on open standards web technology: they use the Web browser front end making it extremely user-friendly, shortening the learning curve. Furthermore, extranets are more economical than creating and maintaining a proprietary network (Ling and Yen, 2001). Tactical extranets increase customer loyalty, commitment and confidence all of which drive revenue and create competitive advantage (Ling and Yen, 2001). They improve customer relations that retain customers and decrease the searching costs for customers that seek for information (Vlosky et al., 2000). Finally, an extranet creates a secure environment for the interchange of critical data with business partners, customers, and suppliers over the Internet (Vlosky et al., 2000). Within it, information can be shared among members in a trusted close circle. An extranet requires security and privacy measures such as firewall server management, issuance and use of digital certificates, or similar means of user authentication, message encryption, as well as virtual private networks (VPNs) that tunnel through the public network (Lin et al., 2002).

#### *1.7.4.3 Benefits*

To acquire and maintain competitive advantage, firms are increasingly turning towards extranets that extend inter-organizational systems to key partnerships which enables them to increase efficiency and effectiveness. In general, an extranet system implies approximately the same benefits provided by the Internet: extranets can facilitate the sharing of information, decrease operating costs, save time and resources, improve customer service, and generally improved business-to-business relationships.

The main difference, and improvement, in relation to Internet systems is the managing of security issues (Vlosky et al., 2000).

Anandarajan et al. (1998) provides a classification of these benefits dividing them in three categories: strategic, operational, and tactical.

As far as the strategic level is concerned, Kallioranta and Vlosky (2004) identified extranet benefits related to Porter's (1985) generic strategy types. These are summarized in the Table III.

Strategy type	Extranet contributions
Cost leadership	<ul style="list-style-type: none"> <li>- Efficient operations</li> <li>- Reduced transaction costs</li> <li>- Standardized and efficient customer service</li> </ul>
Differentiation	<ul style="list-style-type: none"> <li>- Value added services</li> <li>- Differentiated exchange experience</li> <li>- Tailored solutions</li> <li>- Mass customization</li> </ul>
Focus	<ul style="list-style-type: none"> <li>- Improved relationships</li> <li>- Offered to selected customers</li> </ul>
Broad scope	<ul style="list-style-type: none"> <li>- Cost effective to offer to a broad scope of partners</li> </ul>
"Stuck-in-the-middle"	<ul style="list-style-type: none"> <li>- Repeat off-line business processes</li> <li>- Imitate competitors</li> <li>- Serve everybody with generic solution</li> </ul>

*Table III: extranet benefits in relation to Porter's strategies (Kallioranta and Vlosky, 2004)*

In relation to the operational benefits, Kallioranta and Vlosky (2004) identified extranet benefits related to Porter's (1985) value chain framework. They are summarized in the following table.

Value chain activities	Impact of extranets
Inbound logistics and Procurement	<ul style="list-style-type: none"> <li>- Increased collaboration</li> <li>- Reduced order cycle</li> <li>- Reduced search cost</li> <li>- Enables JIT and CRP without EDI</li> <li>- More responsive supply</li> <li>- Small and frequent purchases</li> </ul>
Production and Operations	<ul style="list-style-type: none"> <li>- Sharing supply and demand information</li> <li>- Integration of timely and accurate data into planning</li> <li>- Better demand forecast</li> <li>- Reduced bullwhip effect</li> <li>- Reduced inventory</li> </ul>
Outbound logistics and Distribution	<ul style="list-style-type: none"> <li>- Elimination of intermediaries</li> <li>- Electronic delivery</li> <li>- Accurate shipment</li> <li>- Improved availability of tracking information</li> </ul>
Marketing and Sales	<ul style="list-style-type: none"> <li>- Improved market and customer information</li> <li>- Faster documentation process</li> <li>- Faster payment cycle</li> <li>- Lower communication costs</li> <li>- Improved relationship</li> </ul>
Service (during & after)	<ul style="list-style-type: none"> <li>- 24/7 information access</li> <li>- Faster response</li> <li>- Customized service at low cost</li> </ul>

*Table IV: extranet benefits in relation to Porter's value chain activities (Kallioranta and Vlosky, 2004)*

Tactical implications derived from extranet systems are intangible marketing benefits: they can deepen business partnerships and collaboration (Anandarajan et al., 1998). Extranets offer several value-added services, such as inventory visibility, reporting tools, up-to-date forecasts, online chats, delivery tracking, and customized user interfaces (Kallioranta and Vlosky, 2004).



#### 1.7.4.4 *Criticalities*

Extranet systems show three main critical aspects, derived both from the Internet network use and from the cultural aspect. The first and major concern for companies is the security of the network: extranet is a closed network created upon an open one, consequently there are risks related to the openness on the Internet network and there is the need to use firewalls and to create secure environments. The second concern is related to reliability: business communication requires increased bandwidth to accommodate the transfer of large multimedia files such as video and audio files (Soliman and Janz, 2004). Finally, there is the concern linked to cultural aspects and the necessity of trust among partners. Trust is a critical factor for the integration success and collaboration development.

### 1.7.5 E-Marketplace

#### 1.7.5.1 *Framework*

During the Internet diffusion, there has been a widespread belief in technological determinism: internet services would come to substitute old, inefficient, and static relations with effective and nimble many-to-many forms of collaboration (Rossignoli et al., 2009). The high penetration of the Internet in the enterprises resulted in the establishment of a big number of Internet-based business-to-business e-marketplace (Loukis et al., 2011). The first phase was a euphoric phase: e-marketplace were supposed to dramatically improve the effectiveness and efficiency of commercial processes between companies, radically changing traditional procurement strategies, and restructuring supply chains, organizations and industries (Balocco et al., 2010). After, there was a period in which e-marketplace betrayed the expectations, but then they evolved in models that, involving technologies, participants, relationships and services, have become the most widespread form of mediation among business

partners. E-marketplace participate in the re-design of business processes and generate new collaborative dynamics among participants (Loukis et al., 2011).

#### 1.7.5.2 *Definition*

A detailed definition of e-marketplace is provided by Loukis et al. (2011): “an e-marketplace is defined as an inter-organizational information system providing a “virtual space” where multiple buyers and sellers can communicate and transact, very often supported by various additional required services as well”. Chelariu and Sangtani (2009) declare that an e-marketplace allow a supplier to provide goods and services to customers in a transaction partially or fully automated by information technology. According to them, an e-marketplace has the three basic characteristics of any traditional marketplace: bringing buyers and suppliers together, facilitating transaction logistics and settlement, and providing an institutional infrastructure by way of regulations and laws.

Electronic marketplace can be divided in “vertical”, which refers to the industry-specific ones, and “horizontal”, which cut across industries facilitating the purchase and sale of products and services used in several industries (Loukis et al., 2011). B2b e-marketplace also differ in their pricing mechanism: in some prices are fixed in electronic catalogues, while in others prices are established dynamically through seller or buyer auctions (Grey et al, 2005; Loukis et al., 2011).

#### 1.7.5.3 *Objectives*

The main aim of e-marketplaces is to leverage the internet infrastructure to enable easier contacts between a large number of suppliers and buyers (Grey et al., 2005; Dai and Kauffman, 2006; Rossignoli et al., 2009) and become the channel of choice to support collaborative business processes for products, information, and money exchanges (Rossignoli et al., 2009). Electronic marketplaces can offer a wide range of

advanced services online, from auctions, contract management, providing industry information to sophisticated logistic solutions by closely integrating the activities of buyers and suppliers (Chelariu and Sangtani, 2009). Yao et al. (2009) distinguish two main e-marketplace effects: an electronic integration effect and an electronic brokerage effect.

About the integration effect, e-marketplace sought to provide value by offering services to facilitate collaboration and information sharing. Proposed services included collaborative design and systems to facilitate the sharing of supply chain information such as forecasts and inventory levels. They sought also to improve the entire supply chain efficiency by automating business processes such as procurement, order management, and fulfillment (Grey et al., 2005; Yao et al., 2009; Chelariu and Sangtani, 2009). They participate in the re-design of business processes and generate new collaborative dynamics among participants (Rossignoli et al., 2009).

In relation to the brokerage effect, e-marketplace aggregate product and price information, match supply and demand, and facilitate transactions between buyers and their suppliers. Through these online markets, buyers can do comparison shopping for thousands of suppliers and select the best source among them in real-time. They also can bargain and negotiate with suppliers, place orders, make payments and receive invoices (Dai and Kauffman, 2006). An e-marketplace decrease buyers search costs providing an open online marketplace which makes it easier for the buyer to identify and develop new suppliers among firms that are potentially valuable exchange partners (Grey et al., 2005; Dai and Kauffman, 2006).

#### *1.7.5.4 E-Marketplace models*

E-Marketplaces can vary on the base of the degree of their openness. Chelariu and Sangtani (2009) identify in the industry landscape three types of players.

#### 1.7.5.4.1 Independent exchange

Independent exchange represents a marketing channel broker that performs its role by facilitating exchanges between multiple buyers and sellers in an electronic environment. These independent exchanges vary the services offered on the base of the industry needs. In the business-to-business arena there are different kind of them: they vary from the simple marketplace, which serves merely as a supplier directory, listing suppliers in many industries and hosting supplier catalogues, to the global trading exchange, which, in addition to facilitating auctions, provides its members with access to technical publications and data. Finally, there are independent exchanges that provide trading platforms for commodity products in the energy industry to hosting private collaboration hubs.

Independent exchanges are based on spot transactions of standardized products in horizontal markets with the buyers' primary concern being reduction of cost of goods purchased using an auction mechanism. In these e-marketplaces, effectiveness is achieved by reducing search and transaction costs: through technology, they rapidly match buyers and suppliers following their needs and requests, providing also an increased price transparency and the possibility to dynamically price goods and services through mechanisms such as auctions. Firms trade infrequently with one another and switch easily from one partner to another depending on who offers the best price.

#### 1.7.5.4.2 Industry consortia

Industry consortia derives from the lack of trust in independent exchange marketplace and presents a large player of the industry that act as an intermediary between suppliers and buyers, providing them also additional industry-specific services. These services range from catalogue management and contract management to settlement and transportation management. They increase transportation efficiencies, guarantee

payments and settlements, facilitate transactions in multiple currencies, and others industry-specific services. Products are industry-specific, also commodity products, and not of strategic kind.

#### 1.7.5.4.3 Private exchange

Private exchanges allow a small number of carefully selected trade partners to work together on delivering highly customized and often strategic products. They are created by firms in order to transact with partners in secure environments. Exploiting these private networks, companies have the capabilities to collaborate and to achieve efficiencies by commonly managing logistics, by better use human resources, by achieving lower procurement costs, through the standardization and automatization of information exchange. Private exchange overcome the issues linked to the lack of trust allowing collaboration among firms.

#### 1.7.5.5 Benefits

E-Marketplaces offer to both suppliers and buyers the possibility to enhance their strength in the competitive scenario in several way. In fact, each different type of e-marketplace brings its benefits, and each firm can choose the best solution for itself, basing on the industry and on the needs.

Enhancing collaboration among firms, e-marketplaces create value by increasing communication, decreasing transaction costs, and increasing price transparency (Rossignoli et al., 2009). A different perspective is provided by Grey et al. (2005), which identify three broad categories of value creation: efficient allocation of resources, improved information collection and aggregation, and risk management. As far as the procurement process is concerned, there are several benefits that improve companies' processes, such as the reduction of purchasing cost and the decrease of inventory levels (Wang et al., 2008; Balocco et al., 2010; Loukis et al., 2011), the enhancement of process

integration capabilities, the time savings in the sourcing and purchasing activities, and the increase of the pool of potential suppliers (Balocco et al., 2010). As far as the supply chain management process is concerned, the main benefits are related to the increase of productivity, the increase of service quality, and a more effective control of the material flows along the supply chain (Balocco et al., 2010). E-marketplaces have an impact also on competition and prices: due to reduced search cost, they can increase market efficiency, intensify competition and lower product prices (Loukis et al., 2011).

#### *1.7.5.6 Barriers*

Despite the many benefits associated, the diffusion of e-marketplaces has to face some barriers that limit the request from firms. A first category is identified by technical barriers, mainly associated with network security, hardware and software compatibility and system integration, database conversion, and network bandwidth and connectivity (Loukis et al., 2011; Truman, 2000; Turban et al., 2006). Organizational barriers can be considered the second broad category, they are associated with resistance to change, lack of training, lack of awareness concerning the potential benefits, lack of management commitment and problems in the integration of inter-firm business processes (Loukis et al., 2011). The concerns about the collaboration among firms can be identified as the third category of barriers, such as the lack of strategic alignment, the lack of trust, and various types of conflicts. Finally, the last category of barriers is associated with the lack of required infrastructures, such as appropriate legal and regulatory frameworks, as well as financial, logistics, and telecommunications infrastructures (Loukis et al., 2011).

#### **1.7.6 Radio Frequency Identification (RFID)**

Radio Frequency Identification (RFID) is a technology that provides synchronous traceability of inventory thereby enables a better control and greater flexibility in

managing products throughout the entire supply chain, potentially improving its efficiency, accuracy and security. Opportunities for companies to adopt RFID technology have been greatly enhanced due to continuing decline in the price of RFID tag, availability of RFID testing and support organizations, and availability of wide range of RFID applications for supply chain management (Attaran, 2007).

The potential benefits linked to this technology include increased information for decision making, cost savings, increased stock availability, improvement in customer service and customer targeting, time and inventory efficiencies, improved traceability and reduction in shrinkage, and advantages over the use of barcodes. Nevertheless, the major challenges to adopting RFID technologies are still cost and the low return on investment in the short period, compared to the necessity of an ongoing commitment and enormous resources and capital investment (Lau and Sirichoti, 2012).

### 1.7.7 Blockchain

Collaboration is an increasingly important aspect of the corporate environment. The success of collaboration depends on the readiness of firms and managers to create a trusted environment and build strong relationships among their exchange partners. To ensure this trust, blockchain allows secure exchange of data in a distributed manner, and it starts to impact upon the way organizations are governed, supply chain relationships are structured and transactions are conducted (Wang et al., 2019).

#### 1.7.7.1 *Definition*

A clear definition of blockchain is provided by Treiblmaier (2018): blockchain is “a digital, decentralized and distributed ledger in which transactions are logged and added in chronological order with the goal of creating permanent and tamper-proof records”. It is possible to identify some key characteristics of blockchain technology: decentralization, immutability, pseudonymity, equality and distribution of rights,

trust and provenance, security (Rejeb et al., 2021). Decentralization refers to the fact that there is no single entity that controls transaction processing, while Distributed Ledger Technology (DLT) is a broad term which specifies the mean used to distribute information across multiple sites, countries or institutions and which includes the blockchain (Treiblmaier, 2018). Immutability and security are linked, since when blockchain data entry, they cannot be deleted or changed (Rejeb et al., 2021).

Two main types of blockchain are distinguished in terms of access control, which defines who can read a blockchain, submit transactions to it and participate within the consensus process (Wang et al., 2019). Within a public blockchain (permissionless), every transaction is public and the integrity is maintained either by trusted ledger owners or by the users themselves through untrusted consensus (Treiblmaier, 2018). Within permissioned private blockchains, participants need to obtain an invitation to join and the ledger is permissioned and private. (Wang et al., 2019).

#### *1.7.7.2 Objectives and benefits*

The most promising non-financial blockchain applications include modern supply chain applications, which are based on information sharing, resource sharing, decision synchronization, incentive alignment and collaborative communication. As far as the information sharing is concerned, blockchain can decrease failure through the sharing of structure, standards-based data aligned to supply chain standards (Rejeb et al., 2021). The information security is also improved, thanks to the trusted environment created by blockchain, which can be integrated with existing communication and information systems in order to support the secure access and sharing of sensitive information. The data in the blockchain is immutable and the mechanism used is fault-tolerant, because multiple sources of original information are available (Wang et al., 2019). Finally, blockchain can decrease information asymmetry, enabling trust relationships between partners and improving decision-making. About the resource



sharing, the distributed architecture of blockchain allows the improvement of sharing processes through the increased trust among partners without the need of a central node of control (Rejeb et al., 2021). Blockchain integrates and synchronizes data between different nodes in a supply chain, so it is well suited for coordinating critical decisions among partners.

#### 1.7.7.3 *Barriers*

Although the literature agrees that the blockchain will disrupt the status quo and transform supply chain practices generally for the better, this technology clearly presents many challenges. From an organizational perspective, some supply chain actors may not want the total transparency provided by a blockchain: the unwillingness to share information has long been recognized as a barrier to effective supply chain performance (Wang et al., 2019). Moreover, the technical complexity of the blockchain can be seen as a problem from some actors, and could decrease the confidence in participation. There are also technological challenges: although the blockchain's high level of security, hacking is still possible, and while hacking into a public blockchain requires significant financial and computational power, a permissioned blockchain may be more prone to cyber-attack (Patel et al., 2017). Latency constitutes another barrier, since the time that passes for each verified block is still too long. Finally, due to blockchain immutability, human mistakes can become a problem: when they happen, these cannot be reversed (Patel et al., 2017). Blockchain implementation can find challenges also from an operational point of view. For a supply chain that work with a blockchain, it needs that all related supply chain actors should work with the same technology, and the cost of implementing or participating in a blockchain system are significant (Patel et al., 2017; Wang et al., 2019). Environmental factors also could influence the implementation: from an inter-firm's perspective, global supply chain operate in a complex environment that requires

various parties to comply with diverse laws, regulations and institutions; from an intra-firm's perspective, cultural resistance and existing business processes could be the major barriers to change.

## 1.8 Automotive industry

The main trends of the last decade have been reflected also on the automotive industry, which has to face great challenges for the supply chain management. A priority issue for the industry is to develop demand-driven supply chain to quickly respond to changing consumer needs and expectations. Supply chain management in the automotive industry is amongst the most demanding of any industry (Wiengarten et al., 2010). Supply chain collaboration has become an integral part of supply chain management (Matopoulos et al., 2007).

In the automotive industry, collaboration has resulted in the globalization of supply chains and the manufacture of more complex products to be sold at decreasing prices (Wiengarten et al., 2010). It has been proved that information sharing, joint decision making, and Electronic Data Interchange have a direct and significant role in the performance of supply chain members (Lancaster et al., 2006; Al-Doori, 2019)

Wiengarten et al. (2013) deeply studied the German automotive supplier industry and identified several industry-specific characteristics. Manufacturing industry in general and the automotive industry in particular have always been early adopters of new information technologies and systems. Moreover, automotive industry is highly competitive, making e-business applications an important resource for companies to streamline their supply chains. The challenge of implementing a demand-driven supply chain in the automotive industry is a more involved due to the much larger quantity of parts involved, and the complexity of their supply chains.

Finally, the industry structure is an important factor that strongly characterizes the implementation of strategies and infrastructures aimed at creating a collaborative supply chain. In a study of Manabe et al. (2005), the differences among tiers have been identified: final assemblers are directing first-tier suppliers to implement collaboration technologies, while lower tiers are not inclined towards the adoption of those new technologies because of perceptions of low benefits and high costs and asymmetric benefits in favor of final assemblers and first-tier suppliers.

## 1.9 Grocery industry

In the last decades, the grocery industry went through a period of dramatic change as new store formats entered the market and the traditional approaches to managing the retail supply-chain came under intense pressure. In the grocery retailing industry, variety and volume of products are usually large, resulting in higher implied demand uncertainty. Constant fluctuation in market demand has led to inevitable increases in inventory level and related costs (Lau and Sirichoti, 2012). Due to increased competition from new entrants, many retail chains were pressured to develop some means of strengthening their competitiveness in the market.

In the grocery industry, the potential of B2B e-commerce is manifesting itself in many ways such as online grocery stores, extranets, disintermediation or direct sales bypassing traditional intermediaries and document exchanges via the Internet, including Electronic Data Interchange. The EDI is an option that promised to be very appealing since the beginning, since the cost and errors associated with the invoice data-entry process, and the respective data-entry process of orders by suppliers, were among the most important issues of the models previously diffused in the industry (Pramatari, 2007).

The Internet is one of the main enablers of the supply chain collaboration in grocery industry, because internet-based e-commerce provides firms with cheaper and easier network infrastructure to maintain (Lee et al., 2003). It allows the diffusion of EDI for the communication between suppliers and wholesalers. However, some studies reported that, through information exchanges, the suppliers obtain more trading information and gain more marketing flexibility than the wholesalers, lowering the bargaining power of the latter. To overcome this problem and compensate the negative consequences, grocery suppliers tend to provide two kinds of incentives to their EDI wholesalers, such as price breaks or value-added services. Therefore, EDI use is associated with cooperative trading relationships (Nakayama, 2000).

Radio Frequency Identification (RFID) is another important technology used in grocery industry. Although its implementation constitutes a challenge due to high implementation costs, technical hurdles, lack of expertise and low initial return on investment, Lau and Sirichoti (2012) have reported a study by Deloitte (2003) that identify several benefits linked to RFID implementation, such as: increased on-shelf availability and improved customer service which consequent increase in revenues; reduction of manual physical work; more efficient inventory flow; reduction of overall operating costs; optimization of utilization of assets.

Finally, the latest important technology that is spreading in grocery industry is the blockchain technology. In fact, blockchain effectively enables trust and it enhances the efficiency of traceability systems as it enables identification management, secured data sharing between supply chain actors and a faster data recovery (Yacoub and Castillo, 2021).

## 2. Methodology

In this chapter will be described the methodological approach adopted to carry out this empirical research work.

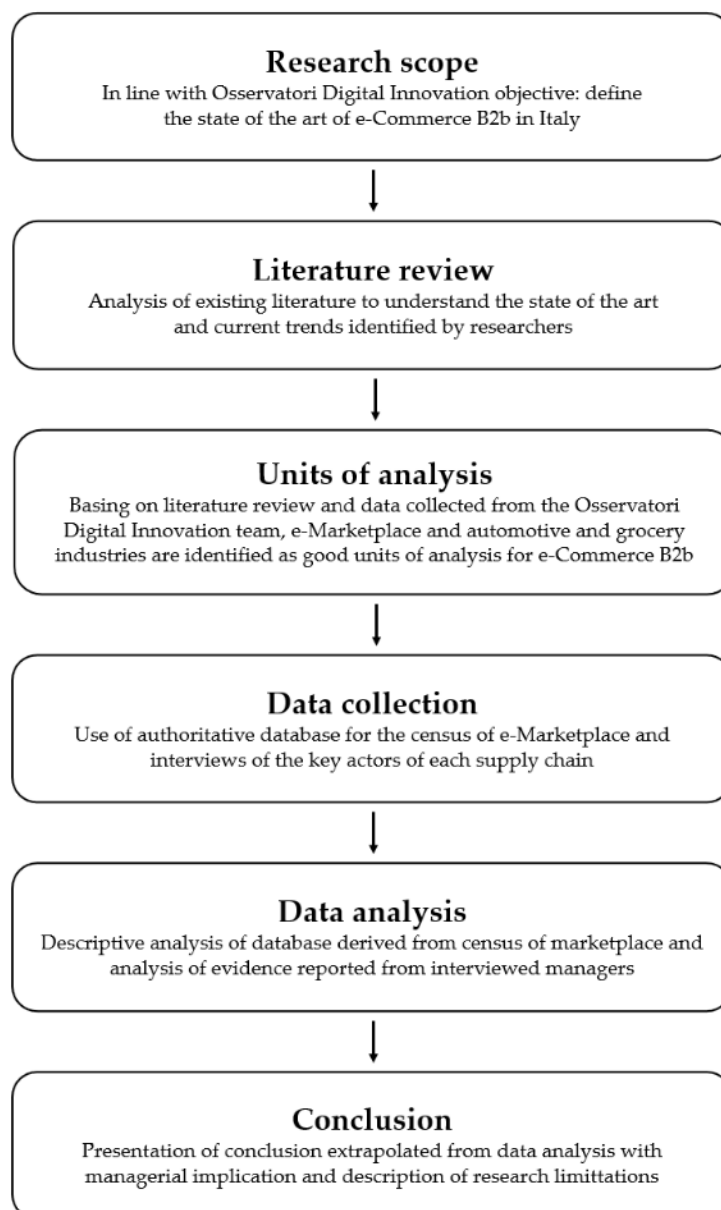


Figure 2.1: research methodology

## 2.1 Objectives

In line with the aim of the Osservatori Digital Innovation of the School of Management of the Politecnico di Milano, the main objective of this empirical research is to better understand the actual state of digital B2b technologies diffusion in Italy, with a focus on EDI and Marketplace B2b, which are considered the best representation of business-to-business digital practices. The second main objective focuses on automotive and grocery supply chains, in order to understand the state of the art of these supply chains towards digitalization processes.

## 2.2 Units of analysis identification

The choice of units of analysis is a critical factor in this research. We choose the units of analysis on the base of preliminary information gathered and taking into consideration several factors, such as the available technologies in support to e-Commerce practices, the principal firms and actors' behaviors, the common culture towards the business opportunities and development potentiality offered by new supply chain collaboration vision.

### 2.2.1 B2b e-Marketplace census

The first unit of analysis is the business-to-business e-Marketplace. As evidenced from several studies, with the Internet diffusion the spread of B2b e-Marketplace has strongly increased and several firms started to base their supply chain processes also on this new technology. Electronic marketplaces offer a wide range of advanced online services (Chelariu and Sangtani, 2009), offering to both suppliers and buyers the possibility to enhance their strength in the competitive scenario. These platforms create value by increasing communication, decreasing transaction costs, and

increasing price transparency (Rossignoli et al., 2009). Some of these benefits are offered also by Electronic Data Interchange (EDI) technologies, but e-Marketplaces have some intrinsic characteristics that make the choice for our analysis fall on them. In fact, they are the most growing B2b integration technology of the last two decades, since result more accessible for firms, especially for less structured ones, due to the lower investment and infrastructure needed and the increased usability, linked also to new XML language used over the Internet.

### 2.2.2 Case studies

According to Yin (2003), a major step in designing and conducting case-based research is the unit of analysis, i.e. the case itself. The empirical research wants to pinpoint the main trends actually characterizing the relationships among business buyers and suppliers, trying to identify the factors that most influence them, such as the most spread technologies, the behaviors of different supply chain actors, the presence of firm-leaders in the digital transformation.

The second relevant aspect that the empirical research wants to deepen is the reaction of different industries to covid-19 impact. The pandemic period, with implied restrictions, has boost the implementation of digital technologies in several industries in order to ensure the work continuity. In this framework, there were some sectors which were already at the forefront in relation to new technologies development and implementation, instead, on the other hand, other industries were very late from this perspective. In order to understand which were the impacts of covid-19 pandemic in those different kinds of industries and how it boosts the innovation and digitalization in supply chain and interfirm relationships, we decided to select two opposite industrial sectors in relation to technology-implementation until the 2020: automotive and grocery ones.

The cases of grocery and automotive industries supply chains have been selected because they represent two opposite sectors in relation to technological development and how they reacted to the crisis caused by covid-19 of the last two years. On one hand, automotive industry has always been at the forefront in relation to new technologies development and implementation, and also in supply chain management it can be considered a leading industry. However, during the crisis due to covid-19, the growing of automotive industry has suffered a slowdown. On the other hand, the diffusion of new technologies usually finds several difficulties in grocery industry mainly due to its fragmented structure, which implies sometimes very strong diversities among actors. In the last two years, there has been a new trend with growing spread, among small actors, of new communication technologies, also due to new needs linked to covid-19 restrictions.

## 2.3 Data collection

As suggested by literature, this research relied on several data sources, such as interviews, follow-up e-mails and archival data like scientific papers and websites.

In the early stage of the project, many websites have been consulted, on the recent trends of both e-marketplace diffusion and automotive and grocery sectors. In this way it was possible to get an initial idea of the environment in which the research would move later, defining the boundaries and highlighting the main tendencies immediately observable. Then, the empirical research starts on two parallel work plans.



### 2.3.1 B2b e-Marketplace census

The census of B2b e-marketplace working in Italy starts with the definition of research study population. To guarantee a sufficient depth of coverage of the analysis and exhaustiveness of the results, three heterogeneous and complementary sources of information were independently analyzed at first and cross-referenced at second: authoritative website rankings, information contained in the literature body, and Internet, through web-mining and keyword search. As for website rankings, both local and international sources were analyzed, namely Casaleggio Associati e-commerce ranking and Alexa Ranking: the latest is the most authoritative ranking provider across the world. Two additional set of e-Marketplace were identified from the analysis of papers and through key word search on Internet, which was performed on some of the most widely used search engines such as Google, Yahoo and Bing.

The identified marketplaces had to satisfy the following conditions: be currently active in at least one country, have a share of traffic from Italian customers greater or equal than 1% of total website's traffic, and have Italian buyers and sellers recently active in the platform, or have Italy as country of origin.

Whereas available, information around B2b e-Marketplaces' industry, sector, year of foundation, country of origin, payment methods and service-provisioning model were gathered exploiting information contained in Alexa Ranking website, through web mining and leveraging on two appropriate databases: Crunchbase and ZoomInfo, which are platforms for finding business information about private and public companies. Their different data sources and channels provide consistency and data coverage for more than 650.000 companies worldwide. The platforms have already been widely used in academic research and the validity of their data has been tested (Block and Sandner, 2009).

### 2.3.2 Sector-related case studies

The primary data source for the analysis of automotive and grocery industries supply chains was 6 interviews conducted between February and April 2022 to key actors of each supply chain. These interviews generally lasted an average of 45 minutes, in which the purpose and the scope of the research were first presented, and then the informant was given space to express him/herself following a path of about 13 semi-structured questions.

Three groups of questions can be identified. In the first phase, there were questions aimed at framing the firm in relation to its size and cash flow. Then, the interview focuses on firm's procurement and sales processes: the objective is to understand, in both in moments of purchase and sales, if the company adopts some e-Procurement and supply chain collaboration practices, which technologies are exploited and what are the behaviors of partners. The ultimate point of the interview aims at investigating a more dynamic perspective, mainly looking at the evolution over time of supply chain relationships, recent trends with particular attention to covid-19 impact, and possible future development path of the industry.

In this respect, informants bias has been addressed in several ways: (1) anonymity has been promised to interviewees to encourage candor; (2) open-ended questioning has been used to give the informants wide scope to relate the concept as they chose; (3) interview techniques like event tracking and non-directive questioning have been used to yield accurate information.

## 2.4 Data analysis

The data collection results in two distinct databases derived from the two data collections: the first output is the database of B2b e-Marketplace with information like

geographical origin, interaction modalities, payment method accepted and others of each reported company; the second research result is the verbatim transcription of each of the six interviews.

#### 2.4.1 Marketplace analysis

The research of e-Marketplace offering services to Italian companies lead to the creation of a database containing 182 marketplaces, each associated with its business information. The database has been processed and a descriptive analysis has been done.

The purpose of descriptive analysis was to reorganize the numerous information variables in order to produce significant insights to describe the state of the art of this technology in Italy. Variables have been analyzed individually and then combined and reworked in order to create a graphical and easily intuitable representation of the technology.

The descriptive analysis presented was finally grouped according to different study perspectives:

- Quantitative analysis: reports the database composition distinguishing the marketplace targeting only businesses and those that address also final consumers;
- New marketplace creation trend: analyze the born of marketplace and reports the trend over the last two decades;
- Geographical diffusion: includes the geographical distribution of marketplace, dividing them on the base of continents and countries;

- Interaction modalities: divides the marketplace basing on the service type offered, providing insights by combining these results with geographical distribution and with the marketplace targets;
- Payment methods: reports the most accepted payment methods and some new solutions like cryptocurrencies.

### 2.4.2 Case studies analysis

The analysis of case studies started with the verbatim transcription of each interview, reporting them line by line and analyzing the output to point out relevant experiences and insights.

Then, basing on information gathered from literature and interviews, it is defined the supply chain structure of each industry, in order to explain the characteristics that can influence the development and implementation of digital communication systems for e-Commerce. It was observed with attention also the profile of each case study and its positioning in supply chain, trying to understand the possible point of view of each interviewed manager.

After the initial analysis of actors and supply chain, the study focuses on information gathered from interviews: evidence are deeply analyzed to identify concepts and behaviors to confirm literature theories or to provide new interesting insights. Through a qualitative analysis the state of the art and main actual trends of each industry, actors' behaviors and potential future development have been reported.

### 3. Marketplace census

The high penetration of the Internet in enterprises resulted in the establishment of a big number of Internet-based business-to-business marketplace. Marketplace are inter-organizational information systems providing a virtual space to companies, where buyers and sellers can exchange information and transact. Electronic B2b marketplace offer to both the possibility to enhance their strength in the competitive scenario, by increasing communication, decreasing transaction costs, improving information collection and aggregation, improving risk management.

The e-Marketplace diffusion in Italy is in continuous development, with new actors and improved offered services. Despite the large companies still leverage mainly on EDI technologies, the use of e-Marketplace is always increasing especially among small firms.

The marketplace technology has intrinsic characteristics such as ease of use and low investment needed that make it very attractive for firms. Among the several advantages offered, there is the possibility for buyers to easily compare the solutions offered by several certified suppliers. On the other hand, the suppliers have the opportunity to gain visibility through these systems and to reach potential hard-to-reach clients with proprietary instruments.

This chapter will present an analysis of the main B2b marketplace that offer the possibility to Italian companies to sell or buy products. The analysis has been conducted working on geographical origin, interaction modality, payment methods and others.

### 3.1 Quantitative analysis

The number of electronic marketplaces offering services in Italy are continuously increasing: the analysis reports 182 e-Marketplace, which vary for several factors.

Specifically, this number comprises the Italian marketplaces which are born and operate in the country but also all the marketplaces that are born or are based in another country and, nowadays, offer their services to Italian firms.

Among the identified platforms, there is a part of them that offer services to both businesses and consumers: some are born as B2C platform and then have created a new business stream dedicated to relationships among firms, but the major part of marketplace is born and offers services only to business companies. Specifically, the latter are 148 marketplaces, instead the platforms that provide services also to final consumers are 34. In Figure 3.1 is reported the proportions of the two types of marketplaces.

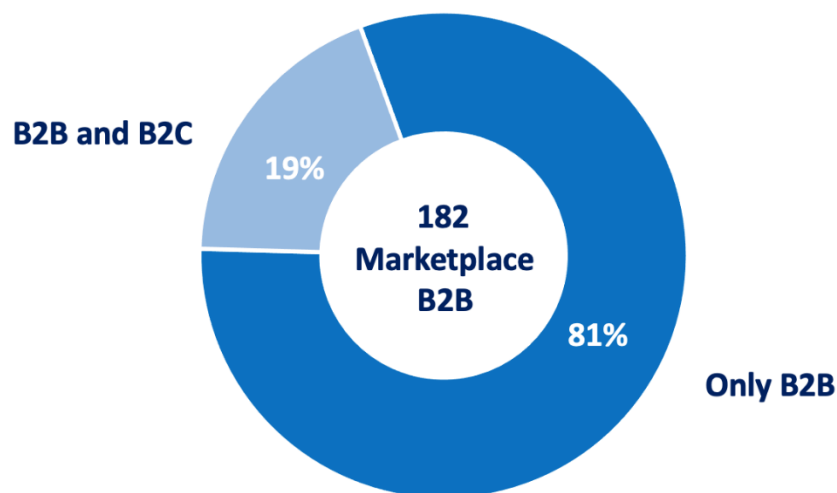


Figure 3.1: the target of marketplace B2b

## 3.2 New marketplace evolution

The diffusion of marketplace started with the spread of the Internet and, in the last two decades, the growth continues exponentially. Since, in cases where the marketplace is a strategic decision of a company for the improvement of the business, the year of marketplace foundation is a private information, the analysis reported the foundation year of each company owning an electronic marketplace.

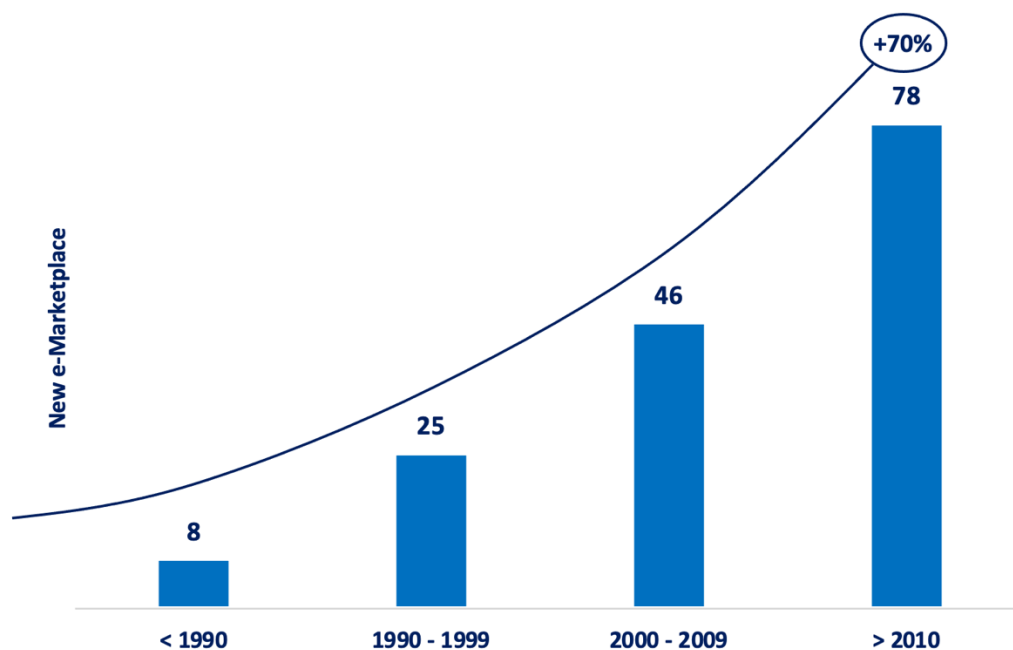


Figure 3.2: new marketplace companies creation trend

As shown in Figure 3.2, data registers an increment of about 70% in the last decade compared to the previous one. The growth is principally due to the increasing spread of this technology among small firms, which are continuously trying to adopt themselves and their business to the always increasing concurrency. So, the business opportunities for these new platforms are increasing, leading entrepreneurs towards the creation of new platforms for specialized targets.

In this statistic, it can be noticed that most of the firms born before the 2000 are companies that are sometimes reinventing themselves to react to world changing scenario. Some have created a marketplace to totally change the business proposition, instead others wanted to complement the service provisioning by amplifying the offer. Starting from 2000, the major part of companies offering an electronic marketplace are born with a business plan mainly based to these platforms. There is an increasing focus on specific targets that led to the development of a number of marketplaces that try to specialize the offer on the base of the need of each target group by providing complementary services that contribute to the growing of competitive advantage over competitors.

### 3.3 Geographical spread

The analysis comprehends electronic marketplaces having company headquarter all over the world. It has been reported that the continent providing more platforms is the Europe with 86 marketplaces, then there is Asia (51), America (40) and a little contribution is provided from Oceania (3) and Africa (2).

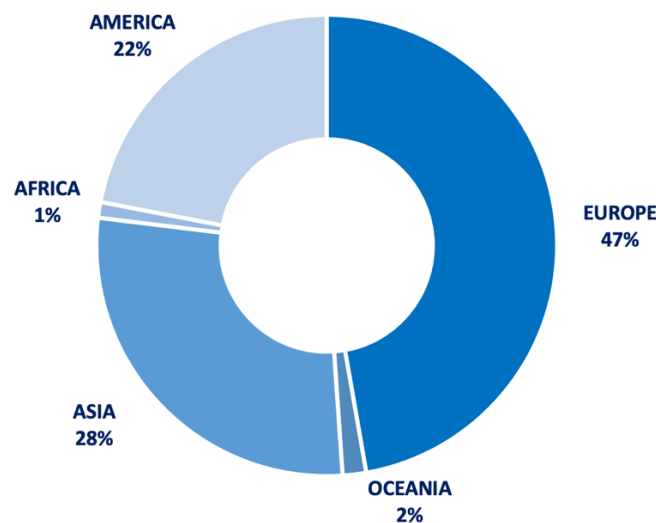


Figure 3.3: continent distribution of marketplace (in %)



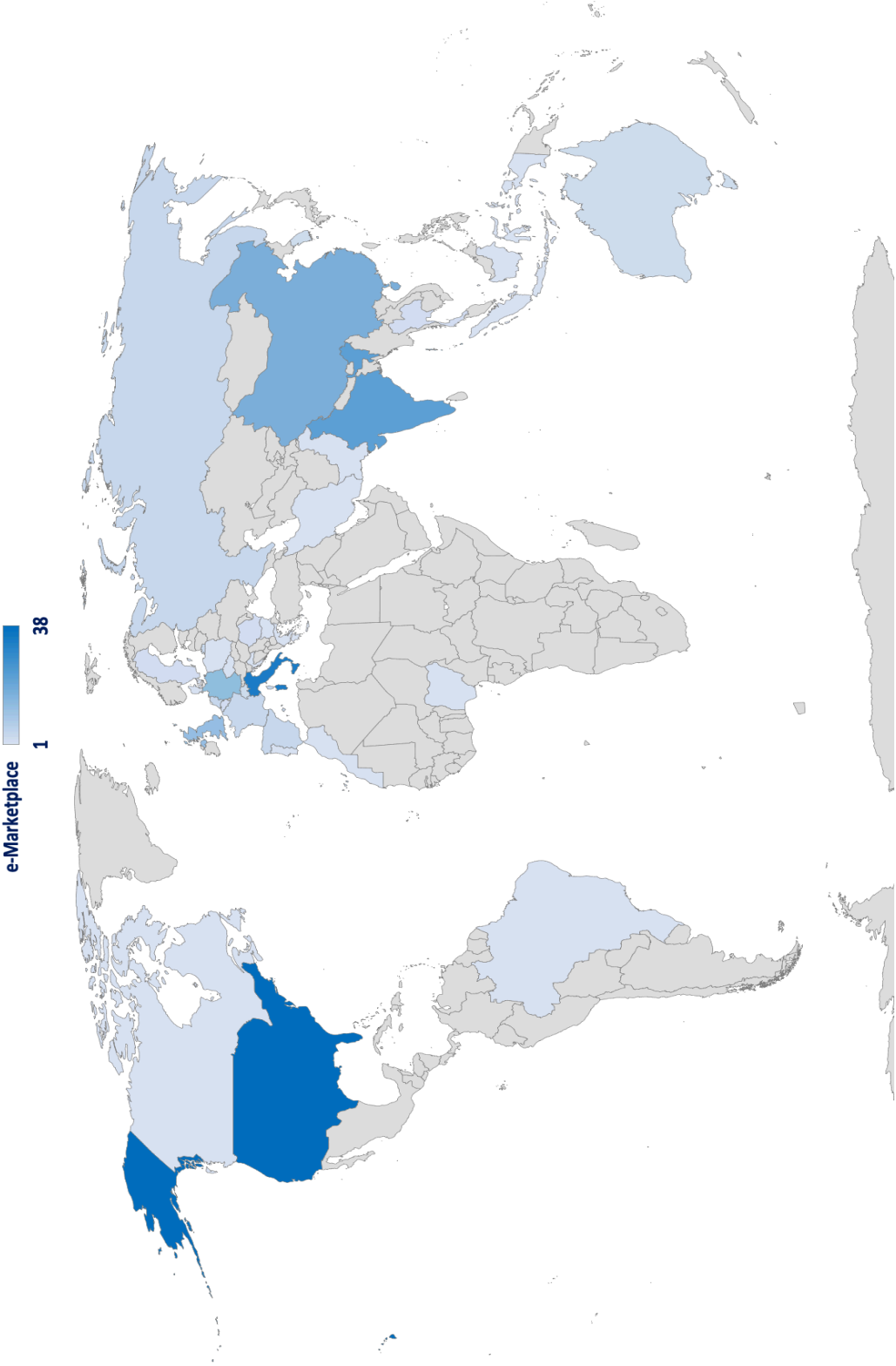


Figure 3.4: marketplace distribution in countries

In Figure 3.3, it is reported the marketplace percentage distribution among continents.

In Figure 3.4 is represented the distribution of marketplace among countries. Italy (33 marketplaces) presents about the 18% of all the platforms. The country that reports the highest number is United States, which have 38 marketplaces providing their services to Italian companies. It, alone, represents almost the entire America contribution, since there are only the Brazil and Canada which have 1 marketplace for each.

The most represented continent is the Europe, with Italy (33), Germany (13) and United Kingdom (12) that are the most present countries. The other European countries are: French (4), Spain (4), Netherland (4), Russia (4), Switzerland (3), Belgium (2), Sweden (2), Romania (2), Bulgaria (1), Croatia (1), Denmark (1), Greece (1), Poland (1), Portugal (1), Czech Republic (1).

Asia covers the 28% of the offer towards Italy. There are two main countries that provide almost the entire amount: India is the native area of 22 marketplace, while China of 17. The others are South-Korea (3), Thailand (2), Indonesia (1), Iran (1), Pakistan (1). The ultimate countries are Australia (3), Morocco (1) and Nigeria (1).

As predictable, the most contribution is provided by most Information-Technologies advanced area of the world, with Asian countries that are in continuous growth.

### 3.4 Interaction modalities

The interaction modality is the main characteristic of a marketplace, since it defines the platform mission and not all the marketplaces intermediate in the same way. There are three types: transactional, to contact supplier, and shop window.

The transaction-based include in its services the purchase process. It provides to buyers the opportunity to search product and supplier and also to finalize the purchase on the platform offering secure transactions.

The supplier contact marketplace offers to buyers the possibility to search for a supplier that offer the searched product. The platform provides all the certified supplier having the product and the possibility to contact them, but not the opportunity to complete the purchase process, which will be defined in a private way between buyer and supplier.

The last category of marketplace offers a virtual space to supplier that are searching for visibility. The platform doesn't provide any service to buyers or suppliers, it simply shows to buyers the suppliers that are searching for, and offer to suppliers the opportunity to be reached from unknown and difficult-to-reach buyers.

The gathered marketplace has been divided basing on interaction modality: it has been reported that the 58% of them provide services strictly related to the provision of suppliers' contact, the 38% offers services in which is include the purchase process, only the 4% are shop window marketplace. In Figure 3.5 is reported the classification of marketplaces with punctual data.

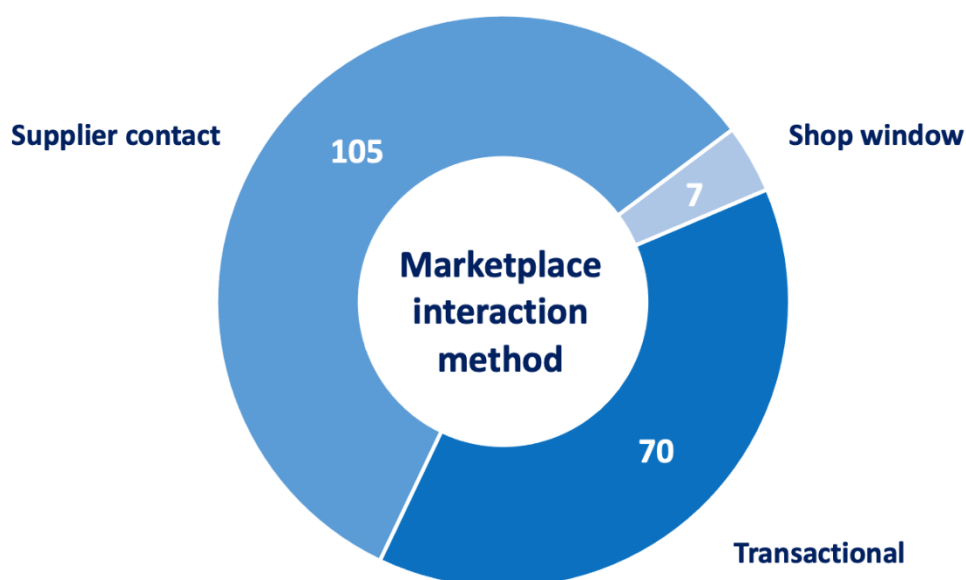


Figure 3.5: marketplace classification basing on interaction modalities

It is interesting to evaluate how the interaction modalities depends also on marketplace targets (Figure 3.6). Specifically, it is emerged that supplier contact marketplace are much more business-to-business platforms (94%) than the ones that address also final costumers (6%). The transaction-based marketplaces are instead more balanced: the 59% of them is only related to business customers, while the 41% offers intermediation services also to consumers. Finally, the shop window results 100% B2b platforms.

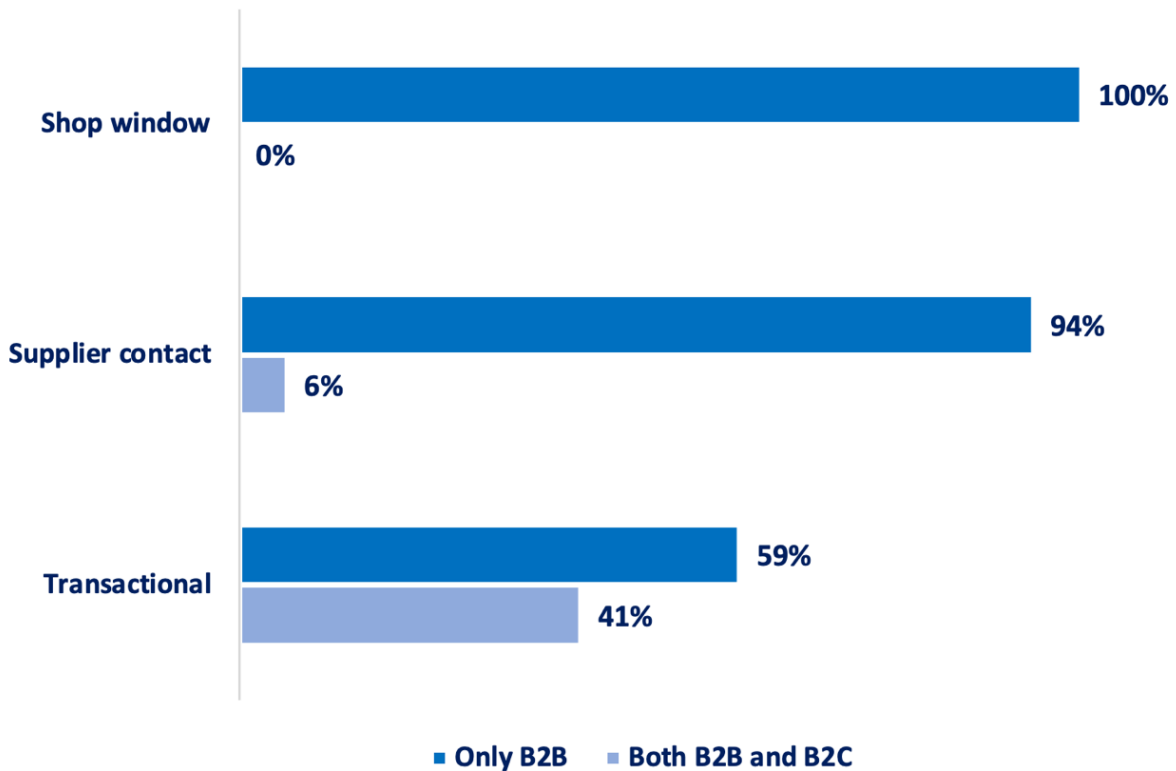


Figure 3.6: analysis of marketplace target within interaction modality categories

It is emerged another factor that characterize the interaction modality: the geographical origin. Gathered data shows that among the marketplace based in Europe there are more transaction-based (50%) than supplier-contact ones (47%). The tendency is the opposite in the other two big continents: in Asia the 71% of marketplaces are supplier contact and only the 29% are transactional, and a similar

situation is in America where there is the 65% of supplier contact marketplaces and the 25% of transaction-based ones. Finally, Africa and Oceania have not enough marketplace to justify inference.

In Figure 3.7 are reported the punctual data: for each continent there is the division among interaction modalities.

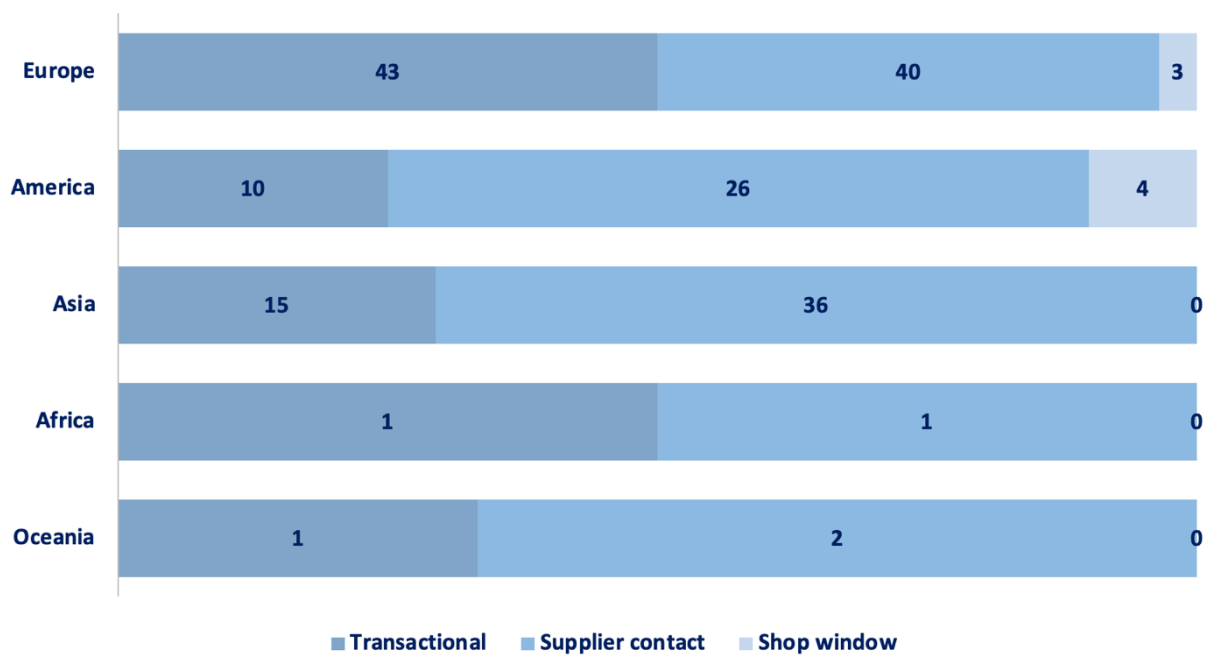


Figure 3.7: marketplace classification in different continents

### 3.5 Payment methods

The last focus of analysis is on payment methods accepted in marketplaces. The Figure 3.8 shows the percentage of all marketplaces covered by each payment method.

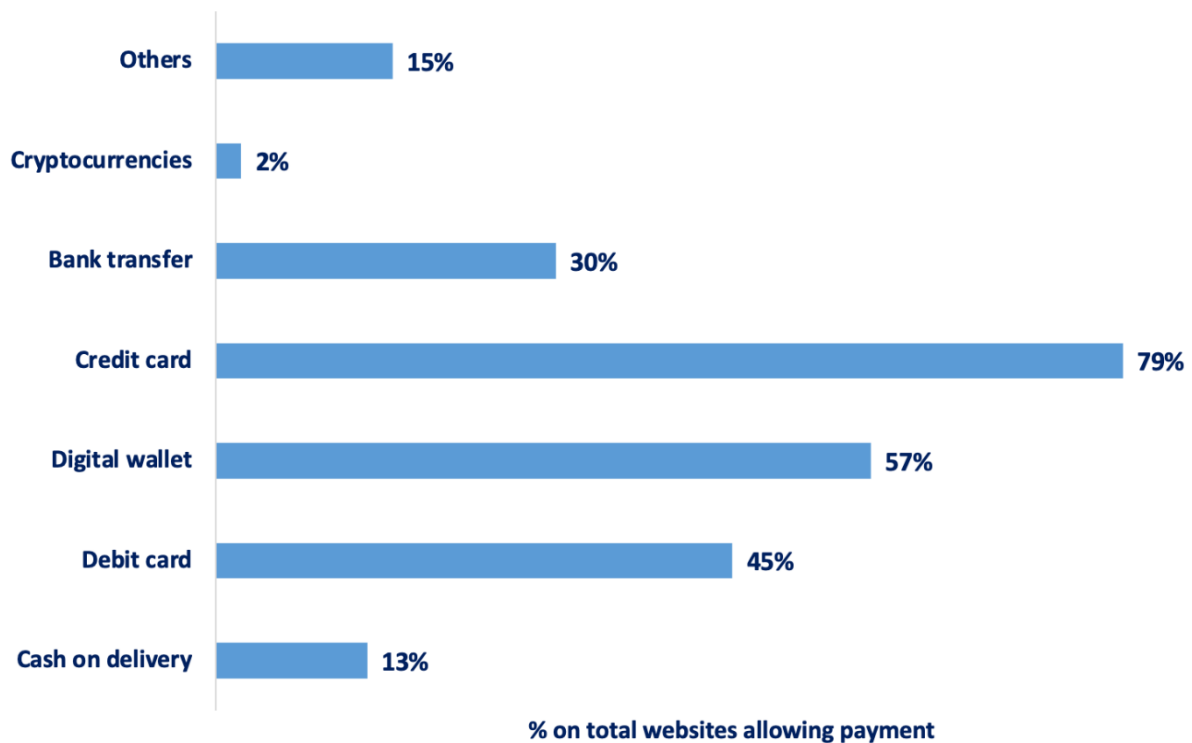


Figure 3.8: diffusion of payment method among marketplaces

The analysis reports that the most accepted method is the payment by credit card, which is allowed in the 79% of marketplaces.

A very appreciated system is the payment through digital wallet (57% of all marketplaces): PayPal wallet is the most diffused thanks to the high security level provided to buyers. The others are Apple Pay, Google Pay, Amazon Pay, Ali Pay, Stripe, Payooner, HiPay and TIPay.

The 45% of marketplace accepts payment through debit card also if is less secure than the credit ones. The bank transfer results not much appreciated, since only the 30% of platforms allow this kind of payment.

The novelty of the last years are the cryptocurrencies: they are accepted only from the 2% of marketplace, but it can be the starting point of a new era, since the last years have seen an exponentially increased attention on Bitcoin, Ethereum and others.

Probably those marketplaces accept payment only based on the most famous cryptocurrencies, since there are still too much uncertain situations about several of them.

Finally, some platforms accept the cash on delivery (13%) or others payment method (15%), such as based on proprietary server or on other services used in other continents.

## 4. Case studies

The Osservatori Digital Innovation reports that in Italy it is exchanged 410 billions of euro leveraging on digital communication technologies and the most diffused systems are EDI, marketplace and extranet.

This chapter presents detailed case studies of automotive and grocery supply chains with different dimensions of analysis, basing the discussion on the evidence provided by actors belonging to those sectors. The final objectives are to define the state of the art of digital business-to-business practices in each industry, to make a comparison between the two deeply different supply chains and to identify the opportunities for future development.

The automotive supply chain has always been among the most innovative ones: the implementation and impact of new business-to-business technologies in this sector will be analyzed in paragraph 3.1.

On the contrary, in Italy the grocery industry has been characterized by a strong fragmentation, which implies several difficulties in the implementation of collaborative practices among firms, especially when they take place between small and unstructured companies. In paragraph 3.2, it will be analyzed the state of the art of grocery supply chain.

An analysis of theoretical contributions derived from case studies will be done in paragraph 3.3. It will present the main trends emerged from analysis, with a special emphasis on what are the main barriers for the diffusion of existing and future digital communication instruments.



## 4.1 Automotive industry

Digital communication systems are largely diffused in automotive industry. Data reported by the Osservatorio Digital Innovation shows a digital technologies penetration rate of 77%. Specifically, automotive sector presents 120.000 firms in Italy that produce value for 128 billions of euro, of which 98 billions are exchange through digital communication instruments.

### 4.1.1 Supply chain structure

Automotive supply chain (Figure 9) shows a quite simple structure that seems to facilitate the processes of communication and integration among actors, with clearly defined roles and levels.

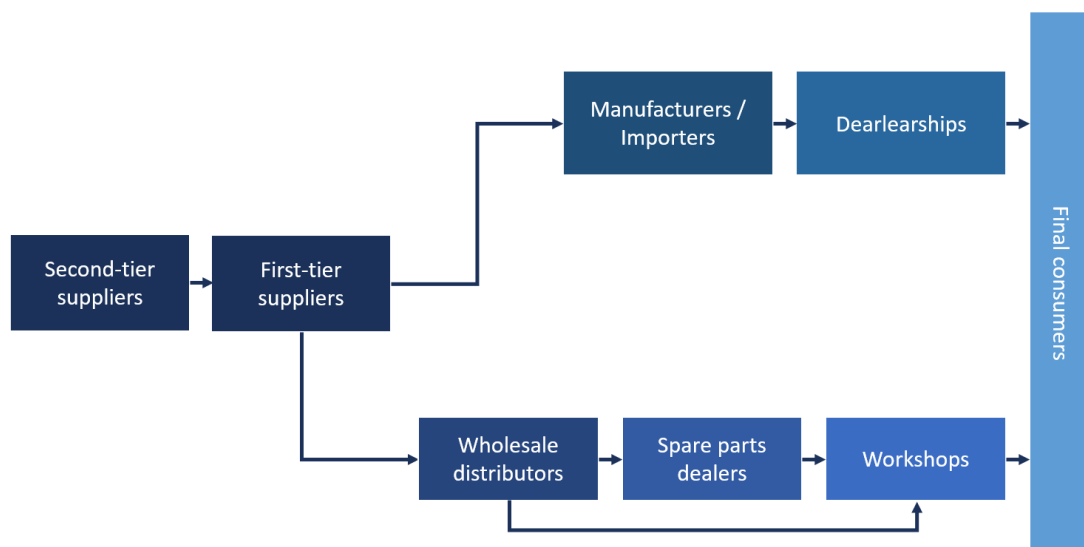


Figure 4.1: automotive supply chain

It starts with second-tier suppliers, which process raw materials to produce automotive components. They vertically communicate with first-tier suppliers, to

which belong to the components assemblers. These two categories comprehend strong big actors and few small ones.

The first-tier suppliers can be linked to two different figures: the manufacturer, which assembles the final product and provides it to dealerships, and the wholesale distributor, which resells the components to spare parts dealers or to mechanical workshops.

Of course, the dealerships and auto repair shops directly interact with final clients.

#### 4.1.2 Case studies' profiles

Since the number of case studies is restricted, the choice of firms to be interviewed aims to obtain the point of view of crucial actors that are able to report the experiences with both large and small partners. Through this expedient, the analysis will be able to define the behaviors of several supply chain's actors, trying to cover both all company dimensions and a number of different chain's levels.

The first and the third interviewed are spare parts dealers. Their position in supply chain implies to have communication, relationships and partnerships with a great number of diverse firms. Downstream, spare parts dealers provide components and services to independent mechanical workshops, which can assume variable dimensions that range from the small independent mechanic enterprise, without any kind of structure, to the structured workshop that provides services that go beyond the simple car repair. On the other hand, spare parts dealers can be linked upstream to two different actors: the wholesale distributor or, sometimes, the first-tier supplier. The former is usually a firm with a high-automated structure based on technological processes aimed at time and space optimization, since efficiency is the key of their business. The latter, first-tier supplier, can be both of large or small dimension, it usually depends on the degree of producer specialization.

The second interviewed is a producer and supplier of high-value products, it's a leader in its sector. The company business implies upstream relationships with large structured suppliers with which there are large volume exchanges and the communication is based on digital instruments. Downstream, the interviewed firm has relationships with both manufacturers and retailers. The manufacturers are high level companies, sometimes luxury ones, with a very strong brand. They are, of course, widely structured firms that use the most recent technologies in all their processes. So, also the communication with them is highly automated and based on digital channels. The retailer category is divided in wholesale distributor, high structured, and with spare parts dealers. The latter can be structured companies but also small ones, affiliated with the major producer.

#### 4.1.3 Business-to-business practices

The selected case studies result enough structured to be able to manage communication through several channels, from the most advanced to the simplest ones.

##### 4.1.3.1 *Sales processes*

Analyzing sale channels, it can be noticed how all the three interviewed offer a proprietary e-Commerce to their clients. Specifically, the two spare parts dealers register only a small portion of sales on this channel, in a range from 5% to 10%, instead the producer company reports sales for 40% on e-Commerce or e-Marketplace in which it is present. The remaining part is distributed on diverse channels, probably due to the different nature of the firms and the different kind of customers.

The producer, which sells its products mainly to large manufacturers, account the 60% of sales based on Electronic Data Interchange (EDI) practices, since it requires

structured customers but ensure a high-quality data exchange, which implies higher efficiency.

Dealers' clients are smaller companies, occasionally composed from only one person. Less structured firms don't have the capability to develop EDI processes for procurement, and in general they don't use digital instruments. Almost all the dealers' sales derive from direct sales or phone contact: in a case, the company has two vendors that go in the client's workshop, alternatively the customer call the dealer and ask for the product needed.

The spare parts dealers reported the growing of a new channel among their customers: the social network WhatsApp. It is increasingly exploited from customers thanks to the ease and immediacy of use and because it doesn't need a personal computer to work, but a smartphone is enough. The killer feature of WhatsApp is the easiness with which mechanics can send a photo of the product needed, avoiding several processes needed to send the photo via personal computer.

Since the large amount of data received in a non-structured formats from customers, dealers have had to adapt their systems with practices aimed at translating incoming orders in a structured format. Through these processes, the amount of manual order registrations strongly decreases and, simultaneously, also the input errors have been largely reduced.

#### *4.1.3.2 Procurement processes*

The procurement processes of all interviewed companies are mainly based on digital channels, with only a small exception for a dealer.

The large producer works mainly with Electronic Data Interchange practices, by establishing commercial relationships with large partners from which the company acquire the largest part of the procurement total amount. However, it uses also other

digital channels, such as e-Marketplace or proprietary web-sites, in a less automated process.

The first dealer registers the 80% of purchases from e-Marketplace and the remaining 20% from EDI practices. It is usual to acquire both from wholesale distributor and small retailer or producer and it reports how the former have much more digital processes and practices than the latter. In relation to e-Marketplace, it results that the 70% are owned from wholesale distributors. Moreover, the interviewed dealer points out that the purchases from small companies are usually scheduled, instead when it is necessary a product in a short time it purchases mainly from wholesale distributors.

The second spare parts dealer registers different purchase proportions: the biggest amount of procurement is acquired through EDI technologies (60%), which is mainly used for the warehouse reintegration. The remaining part is acquired from e-Marketplace and proprietary e-Commerce (30%) or through direct or phone purchase (10%). The latter practices are referred to procurement from high-specialized producers, when the dealer needs high-skilled works from producers that are not so structured from the managerial point of view.

#### *4.1.3.3 Collaboration practices*

The most diffused and effective collaboration practice is the Vendor Managed Inventory (VMI): it allows companies to improve the warehouse management basing the procurement on sales and inventory data. In automotive supply chain, VMI is developed through EDI channels because it requires a high amount of data interchange, so it is needed also high precision in communication. A spare parts dealer reports the use of VMI practice for the automated inventory management with larger suppliers and it integrates to VMI also the use of Radio Frequency Identification (RFID), which increase the efficiency of logistic processes.

Changing perspective, the producer company interviewed reports the implementation, among collaboration project, of some tools for small and medium partners. Nevertheless, the firm doesn't register a good response from small partners: on the contrary, they evidence a critical situation of actors' competences and infrastructure, since they result not able to leverage on those tools to improve their own efficiency.

Finally, the first dealer reports the development of a new tool that allows customers to create a personalized draft quote, to make it able to provide better information to its own clients: this is the evidence that both the partners can benefit from collaborative practices.

#### 4.1.4 Theoretical evidence

The interviews of central actors allow the gathering of information related to a large part of the supply chain. From the evidence collected, it is possible to identify some critical aspects of the chain, and also the actors' behaviors in front of them. In this paragraph will be reported the main theoretical indications emerged from the information collected during the interviews.

##### 4.1.4.1 *Digital B2b benefits*

It has been widely discussed the importance of digital evolution of business-to-business interaction processes. Nevertheless, from data collected it emerges that there are still too many actors unaware of the advantages derived from the implementation of digital processes. This unconsciousness is mainly present among the unstructured companies, which are still wary of digital potentiality.

From the interviews, it emerged that firms, which have implemented and every day exploit digital business-to-business practices, confirm the benefits reported in

literature from researchers. Managers claim the strong improvement derived from the integration of technologies in their own company processes, which consist in lower manual errors, lower costs, better resources management and higher overall efficiency. In an interview, the supply chain manager of a spare parts dealer reports the advantages derived from the implementation of Electronic Data Interchange in its company:

*We have automated several processes by exploiting EDI. It has led our company to save 1/1,5 working units, to improve the processes lowering the management errors and improving efficiency.*

(Supply Chain Manager)

In front of the evidence provided by good results, it is emerged that large firms understand the importance of innovating processes and the consequent long-term advantages derived for the whole supply chain. Their managers are aware that almost whatever process could be improved through investments in new technologies implementation and that these investments will provide a positive return for the company in the future. During the interview, the logistic manager of the second interviewed company pointed out:

*We have always done digital transformation of our processes. Where there is paper, there is inefficiency, and there is a process that we can digitalize.*

(Logistic Manager)

In this message, there is the manager consciousness that digital transformation can exclusively add value to the firm, and can also provide competitive advantage.

#### 4.1.4.2 *The state of the art*

In line with hypothesis derived from literature, the interviews register that the automotive supply chain is at the forefront in terms of digital communication practices. The three actors are actively using information technologies such as EDI or e-Marketplace for their business activities and are convinced about the effectiveness of these solutions. Despite the always increased positive evidence reported by adopters, there are still barriers for the diffusion of digital practices linked to the behaviors of some supply chain actors.

All the three interviewed firms report that small business partners are unaware, unwilling and also unprepared to invest for the implementation of digital processes. The first company affirms that the 80% of their clients are small and unstructured to such an extent that they haven't a personal computer in their workshop and externalize whatever administrative operation. This problem is faced from both the spare parts dealers interviewed, since also the third company reports the same customers' structure. As consequence of this condition, these two firms have to act as translator of received orders to convert them in a code that identify the products requested.

It is clear that there is still a strong discrepancy between structured companies and unstructured ones: this creates problems for those actors in the supply chain that are between high-developed suppliers and very unstructured customers. As reported from the first interviewed company manager:

*We cannot afford to not have digital systems, but we also can't fully exploit the advantages that they can provide, because our clients are not digital.*

(Logistic Manager)



The actors like dealers and, sometimes, wholesale distributors must invest for the adoption of digital communication practices but can't benefit of all their potential positive impacts.

#### 4.1.4.3 *The main barrier: unconsciousness*

The information collected report that the lack of knowledge of small and, sometimes, medium enterprises about the opportunities offered by digital technologies and processes is the main barrier for the development of collaboration practices. Those actors result unwilling to invest in such solutions and this is due to the technological unconsciousness. The large producer interviewed company logistic manager has resumed the problem as follow:

*The small companies are not aware of benefits. If you suggest to a small firm a project that require initial investment, you will not convince it. Instead, if you force it, it will invest in the project and then will became aware of advantages.*

(Logistic Manager)

It seems necessary to force small actors because of the cultural problems limit the trust of those firms towards digital systems. The second firm interviewed explains that estimations about potential financial savings thank to the implementation of those practices are possible, also if, on the contrary, it's not easy to predict changes from the supply chain automation point of view. Despite this, small actors remain unwilling towards the transformation and, for this reason, it became necessary to force them.

Structured companies' managers claim the importance and effectiveness of digital solutions, but it is emerged that there are still some of them that have not fully understand that those systems should be an integrated part of company business. The

supply chain manager of the third interviewed company talking about e-Commerce using the following words:

*They are more work tools than e-Commerce.*

(Supply Chain Manager)

It can be noticed how this manager is not aware about the importance of the integration of these instruments, since he perceives the e-Commerce as something external to the company, not an integral part of it. A confirmation is provided by the fact that its company started to implement digital communication systems under the pressure of suppliers, and only after having done it the firm started to become aware about the advantages of technology.

## 4.2 Grocery industry

In Italy, grocery industry produces value for 330 billions of euro. It is a very fragmented sector composed from 1,5 millions of firms. Due to its fragmentation, digital communication systems have several difficulties in penetrating: the Osservatorio Digital Innovation reports that only 78 billions of euro are exchanged basing on digital systems, for a penetration rate of 24%.

### 4.2.1 Supply chain structure

Grocery industry is based on a supply chain (Figure 4.2) that views the presence of both small and large actors in all the production and distribution phases.

The first suppliers are chemical and packaging suppliers, which are usually large and structured companies, and breeders and farmers, which can be big companies with high production levels or small firms, sometimes also autonomous farmers.

The latter category, in some cases, can be linked directly with the final customers, but usually all the suppliers are connected to producers. This category presents several kinds of companies, which can be structured and automated or small and traditional.

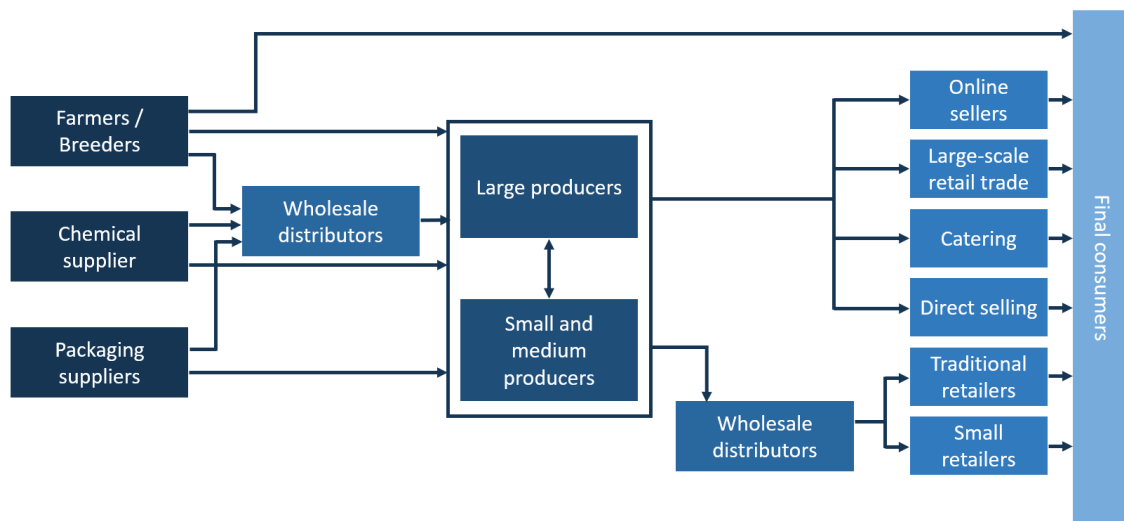


Figure 4.2: grocery supply chain

The last step before the final clients are the retailers. It is a very fragmented category, there are large-scale retail trade, online sellers, small retailers, and channels directly affiliated to the producers. The distribution from producers to retailers can be managed by the producer itself or by wholesale distributors.

#### 4.2.2 Case studies' profiles

The fragmented structure of grocery supply chain makes it hard the understanding of workflows in all steps without a deep analysis based on a large number of case studies. To report the evidence of a large supply chain part, three crucial actors that have relationships with several suppliers and customers have been selected for the interviews. Through this expedient, the analysis will be able to define the behaviors of

several supply chain's actors, trying to cover both all company dimensions and a number of different chain's levels.

The first interviewed company is a large producer and distributor. Its position in supply chain implies to have communication, relationships and partnerships with a great number of diverse firms. Downstream, the firm is linked with a number of different retailers, which vary from large-scale retail trades to small independent retailers. About the latter, the producer company is not always directly linked to them, since there are also cases in which there is a wholesale distributor as mediator. The vastity of retailers with which the company works implies relationships based on several different channels, since the partners are not always structured firms. Upstream, the producer has relationships mainly with large suppliers, with which has the possibility to exploit the efficient digital channels. It can be linked also to other producer of smaller dimension, but the tendency is always to use technological systems for as many operations as possible.

The second interviewed company is a large-scale retail trade. Since its dimension, it is a structured company that can leverage on the latest digital systems. It is at the end of the supply chain and downstream is directly linked with the final consumer, with a series of hypermarket. On the other hand, upstream the firm is linked with a number of diverse partners, which vary from large to small producers, and, in some cases, they can be farmers or breeders' companies.

The third interview took place with a consortium of large-scale retail trade. Downstream, this consortium works as a wholesale distributor: it distributes the products among large retailers, which are structured and allow the use of digital technologies for data interchange. On the other side, their upstream suppliers are producers of both large and small dimensions. Relationships with them are based on digital systems, but not always the received orders are in structured formats.

### 4.2.3 Business-to-business practices

The selected case studies are structured companies with the capabilities to exploiting digital communication channels. At the same time, they have some small and unstructured partners, with which have to use more traditional channels.

#### 4.2.3.1 *Sales processes*

The different nature of the three interviewed companies implies that they leverage on different instruments for communication with partners.

The first interviewed producer company and the consortium report that their communication is mainly based on Electronic Data Interchange, respectively for the 50% and for the 99% of sales. Both leverage on this technology for the communication with large-scale retail trades, which, thanks to their structure, have the capabilities for implementing EDI.

The remaining parts are addressed in different ways. The consortium registers that it offers also an e-Commerce to its clients, but it contributes only for about 1% of sales.

The large producer instead is also a direct distributor of its product to small retailers of directly to final consumers. These orders are mostly received through e-mail or manual orders, but the company provide also a proprietary tool that offer the possibility to provide a structured order. Since the amount of unstructured order is about the 50% of sales, the producer company has developed an instrument based on machine learning techniques. This tool allows the translation of manually semi-structured received orders in structured formats, which then are directly linked with SAP software.

The last interviewed firm, the large-scale retail trade, has not downstream relationships with other business. They sale the products directly to the final

customers through their supermarket (96%) and their business-to-consumer e-Commerce (4%).

#### 4.2.3.2 *Procurement processes*

The high fragmented structure of grocery supply chain implies the necessity to have procurement relationships with both large and small suppliers and producers.

Since the dimension of interviewed companies, the most leveraged communication instrument is the EDI. The large-scale retail trade company reports a procurement process based for the 95% on Electronic Data Interchange, with a total amount of 900 suppliers. The consortium also registers the major part of procurement (53%) based on this system, leveraged especially with large suppliers.

The remaining parts of orders are managed in different ways. The former receives orders on a private channel through File Transfer Protocol (FTP) or by e-mail, instead the latter has not a private channel and exploit only e-mail and fax.

Both the companies, once the order is received in a structured format, have the need to optimize the conversion in a structured one, to avoid the problem of data misalignment. The two firms leverage on digital instruments like specialized software or Optical Character Recognition (OCR) and are able to automate the conversion. There is an exception for the consortium, which has still problems with some formats that need the manual conversion of orders (4%).

#### 4.2.3.3 *Collaboration practices*

All the three interviews report cases of supply chain collaboration practices. Specifically, the most important one is the Vendor Managed Inventory (VMI), leveraged by all of them in different proportions.

The producer company use VMI for only the 1% of procurement with a single supplier. The consortium reports the use of VMI leveraging the EDI systems: it is exploited for

about the 7% of procurement with two among the most important suppliers. With those companies the producer shares inventory and strategic data, like stocks and sales. Moreover, the manager affirms that there are a number of suppliers that are asking for VMI, but implementation projects are still absent. Finally, large-scale retail trade firm registers that the VMI practices are adopted with four large suppliers, with which are shared data about inventory stocks but not about sales.

From the analysis it is emerged that some companies adapt their data sharing on the base of promotional period. Since they are very frequent, there is the need to automate some make-order processes.

#### 4.2.4 Theoretical evidence

The fragmented structure of the supply chain suggests to not generalize to much the data gathered from case studies. The interviews of central actors that exchange information with several both large and small suppliers and customers, allow the identification of some critical aspects of the chain and the actors' behaviors in front of them. In this paragraph will be reported the main theoretical indications emerged from the information collected through the interviews.

##### 4.2.4.1 *State of the art*

The interviews of the three diverse actors confirm the tendency of the grocery industry towards an increasing digitalization of communication and processes. In this direction, there are still important barriers such as unconsciousness of benefits and investments needed.

The characteristic structure of the supply chain strongly influences the performances of the actors and the fragmented structure is then reflected on existing differences

among actors. As reported from the supply chain manager of the large producer firm interviewed:

*The industry has a very fragmented structure, consequently not all the clients, including large companies, have EDI. In the same cooperative you can find very digitalized actors and very backward companies. There is a lot of disparity.*

(Supply Chain Manager)

In this context, large developed companies are working for encouraging the transformation of small ones. They can leverage on their strong market-leader status and very often they can enforce unwilling firms to start the digitalization process. The manager of large-scale retail trade interviewed have pointed out:

*Small suppliers are adapting themselves to new standards because we have the strength to impose our communication methods.*

(Large Retailer Manager)

The increasing transformation of small firms have positive externalities on partners and on the entire supply chain and the actors are always more aware about the advantages. Despite this, it is reported that very often the small firms remain disinterested in transformation and unwilling to make investments.

The industry fragmentation implies also technical problems for producers and distributors, since a lot of times it is not possible to standardize products due to their nature. This issue is reported also from the interviewed large-scale retail manager, which explain the need of higher synchronization among actors about products master data.



#### 4.2.4.2 B2b benefits and small firms' unconsciousness

Awareness about the benefits provided by digital communication systems is always increasing among adopters. In addition to savings related to cost inefficiencies, firms observe also benefits derived from the positive externalities such as higher synchronization with partners and integration in the chain. For example, in this industry a crucial factor is the alignment about product characteristics and master data, and it can be reached in a much more effective way through digital solutions.

Also in this industry, the main barrier for the fully integration through digital systems are the unstructured and culturally backward actors. It is registered that there are still too many companies that are incapable and unwilling to invest for the implementation of new technological instruments for digital communication. As reported from the supply chain manager of the large producer company:

*In negotiating table clients are still in a negative position about EDI. They see digital transformation only as a cost. They are not aware about advantages.*

(Supply Chain Manager)

Unconsciousness about potentiality of digital instruments is registered also from an interviewed manager. Specifically, it has been reported that the interviewed consortium sales only the 1% of their products through e-Commerce. During the interview, the manager pointed out:

*Every company has an e-Commerce, so we have it too.*

(Logistic Manager)

In addition, he has demonstrated to not agree the implementation of VMI with most possible partners, since he affirms that internally the company is able to reach better

performances in terms of inventory management. From this evidence and from the performance of firm's e-Commerce it can be recognized the absence of awareness also in some actors that works with digital solution. In those companies can be seen the not-fully exploitation of digital systems potentialities, probably due to the cultural backward of leading managers.

#### 4.2.4.3 Future trends

For the future, it is important for the supply chain to boost the diffusion of digital systems for communication. Interviewed company managers sustain that the priority for the development of the chain is the spread of those solutions rather than the implementation of new technologies. In this view, the presence of external non-profit organization that try to spread the awareness of the benefits provided by technology is very appreciated. Specifically, the supply chain manager interviewed affirms:

*There are organizations like GS1 that push the entire industry, for example through the project for next three years based on digitalization, sustainability and logistic collaboration. Thanks to those actors, managers and directors have started to pay higher attention to digitalization.*

(Supply Chain Manager)

The interviews have highlighted also the managers interest in relation to blockchain technology. They recognized its potentiality posing the attention on product traceability, which can be a critical aspect for fresh food, such as meat, fish and fruit. On the other hand, they report the capabilities needed for the blockchain implementation and sustain that the industry is still not ready.

In relation to the implementation of new technological instruments, an interviewed manager explains the magnitude of changes needed for the process:

*Technologies are enabling, but the real impact of all the new processes are over the organization: you need skilled people to manage new processes and without a strength structure above you cannot do anything.*

(Large Retailer Manager)

It evidences the need of a structured firm not only in term of investment capacity, but also in relation to other capabilities like skilled human resources.

The same manager explains also another important factor:

*For collaborative processes it is fundamental to have a critical mass. If everyone collaborates, everyone gains. Otherwise, the risk is too high.*

(Large Retailer Manager)

It remarks the concept on the whole supply chain interdependency, already identified from several researchers.

## 4.3 Theoretical contributions and discussion

The qualitative analysis of case studies has allowed the identification of some critical factors for the development and diffusion of digital systems for integration. Posing the attention on two deeply diverse industries there is the opportunity to understand if there are general trends, but also the existence of common drivers and barriers.

### 4.3.1 Leaders as pioneers

The first critical point emerged is the general need of industry leaders as pioneers. In all analyzed case studies, it is evident the contraposition of two main groups: the adopters of digital technologies, which are aware about the advantages given from these systems, and the non-adopters, which are usually small companies with limited

financial resources that decline the promise of a better future derived from relevant initial investments.

The attempts of large companies to convince the small ones through the planning of training courses, the provision of proprietary tools that doesn't need high investments to be used, the offer of more profitable commercial conditions, have not had the desired effects and the divided condition is not changed.

It is reported that the only instrument with which large firms can convince the non-adopters to implement new systems is to force them towards the transformation. Adopters have to leverage on their positive experience with digital solutions and on their strength in term of bargaining power to lead the unwilling companies towards the digitalization. In doing so, they have also to recognize the difficulties, financial and not, of small traditional firms in starting a deep organizational process of renewal and helping them with their instruments and experience.

#### 4.3.2 Need of common standards

The integration among companies has as fundamental point the use of common communication protocols, formats and, in cases like the grocery industry, also measures. Case studies have revealed that the absence of common standards implies relevant costs for companies that leverage on digital systems, since it slows down the information exchange and can lead to translation errors.

In order to optimize the data communication and to decrease the associated costs, large firms have developed proprietary systems or have established relationships with companies owning translation software for the conversion of orders in the proprietary formats. These expedients allow them to accelerate the order transmission process and,

sometimes, to save costs, but it remains less efficient than the use of common standards within the industry.

An important work for standards adoption in the whole industry is done from interorganizational entities. In their work for the unification of communication and measurement standards, these organizations claim also the need of small entities as integral part of the industry, because the standards must be established to create a big common protocol.

### 4.3.3 Cultural backward

The most important critical factor emerged from the analysis is the lack of the correct industry mindset and vision among managers. Gathered data shows that, in addition to small companies' unconsciousness, there is a deep problem related to the conservative nature of managerial decisions.

Large firms' managers demonstrate that, despite their company exploit digital communication systems from several years due to the competitive advantage provided by technologies, they are still doubtful about the effective necessity of continuous process innovation through new technologies.

The interviews to some managers show their tendency to have a short-term vision, because their mindset is still based on traditional working systems and new technologies like blockchain appears not-convenient.

The lack of long-term vision and a sort of uncertainty of effective necessity of continuous innovation can have an impact also on small unwilling firms, which will not perceive the risk of being too backward from market standard processes.

## 5. Conclusion

This study analyzed the world of e-Commerce business-to-business with its potentialities and associated technologies. Specifically, among technologies it has been analyzed the diffusion of e-Marketplace in Italian country, gathering information about all the marketplace over the world that provide their services to Italian firms. Then, the attention has been focused on two specific industries, the automotive and the grocery. They have been chosen mainly due to their diverse approach towards new technologies and for their opposite reaction to pandemic period of the last two years. Results report that there are 182 marketplace B2b actually operating in Italy. The number is continuously increasing due to new always more specialized marketplace emerging, which aim to better address specific target groups. Despite the positive trend, interviewed companies report that there are still diffusion and implementation problems of digital technologies for e-Commerce in both automotive and grocery

industry. The unstructured firms are unable and unwilling to invest for their implementation, consequently creating inefficiencies for large actors that need to interact with them, slowing down the entire supply chain development. Finally, it is reported that the large firms drive the supply chain, since there is still a lack of the correct vision.

## 5.1 Managerial implications

The managerial contributions have been elaborated basing on insights derived from the literature review and the empirical study. The most important factor is the manager consciousness of problem and of available means to react and improve the current situation, both of the company and of the whole supply chain.

Large firms' managers have to leverage on their awareness of competitive advantage that digital technologies can provide and on their bargaining power in order to lead unstructured and small firms towards the integration in supply chain through these systems. Their experience and instruments provide the power for creating, and providing to business partners, the winning solution for small companies, a sort of tradeoff among initial investment needed and short term benefits, since in long term partners will recognize the effectiveness of digital systems.

A fundamental thing that doesn't depends from technological innovation and development is the identification of common standards. The managers, especially those of large companies, have to understand the importance and focus the supply chain attention over this problem, which appears among those with fastest resolution. Before collaboration between firms, it's needed between managers, to work together on the standardization of communication formats. From this, the whole supply chain will gain benefits, also small enterprises.

Finally, managers have to develop a common vision of the future based on new technological systems. The success of collaboration projects is based on a critical mass of companies implementing the instruments that allow those processes. To lead the supply chain towards collaboration, a common vision that totally change the traditional working processes is the base of future competitiveness of Italian firms in the world.

## 5.2 Limitations and future research

This study presents also some limitations. The state of the art of e-Commerce B2b in Italy is not strictly quantifiable through e-Marketplace, instead can be better defined through the study of other important and diffused technologies like, for example, Electronic Data Interchange. Moreover, it must be considered the continuous evolution of technologies that support e-Commerce B2b. In this context, the B2b framework will continuously change, influencing business and working processes, and further analysis can better define the always changing scenario.

A second limitation is the technique used for collect the electronic marketplace operating in Italy. The authors are conscious that a perfect technique cannot exist, consequently it could be always improved and new marketplace could be discovered. Moreover, the number of platforms providing service to Italian companies should be periodically adjourned because it is increasing during the years.

The analysis of gathered marketplace can be improved with the review of other aspects characterizing the platforms, such as the industries in which they work, the kinds of logistic services offered, the customer-care services, and others. With a deeper analysis, new interesting insights can be obtained.



The automotive and grocery industries analysis is limited from the low number of companies interviewed: it is clear the absence of several actors of each supply chain, which point of view can result relevant for the analysis. The collection of experiences and insights of more firms can contribute to the creation of a better framework, better defining the technologies used at each level, the relationships among actors and the vision of the future.



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