



UNIVERSITÀ POLITECNICA DELLE MARCHE  
FACOLTÀ DI ECONOMIA “GIORGIO FUÀ”

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Corso di Laurea Magistrale in International Economics and Commerce

**THE RELEVANCE OF SUPPLIER  
RELATIONSHIP FOR DEVELOPING A  
BUSINESS**

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Anno Accademico 2018 – 2019





# TABLE OF CONTENTS

<b>INTRODUCTION</b> .....	1
<b>I. B2B MARKETS: THE INDUSTRIAL NETWORK APPROACH</b> .....	7
I.1 Evolution of the Industrial Marketing Schools of thought.....	7
I.2 IMP Group Perspective on Business Markets .....	9
I.3 Interaction and Network Approach: the Models for Description and Analysis of Business Relationships in Business Networks. ....	15
I.3.1 The Concept of Business Relationship .....	16
I.3.2 An Interaction Model .....	18
I.3.3 A Network-based Framework: ARA Model .....	25
<b>II. PURCHASING IN BUSINESS NETWORKS</b> .....	33
Introduction.....	33
II.1 Customer-Supplier Business Relationship .....	35
II.1.1 The approaches to the relationship: the interaction strategy.....	36
II.1.2 General features of customer-supplier relationships .....	41
II.1.3 The development of the buyer-seller relationship .....	44
II.1.4 Conditions for establishing a well-functioning cooperation.....	47
II.2 Relationship with the supplier.....	49
II.2.1 Suppliers relationships: three strategical issues.....	51
II.2.2 Relationship with suppliers for solving problems .....	55
II.3 Interacting with suppliers for designing the offering .....	58

II.3.1	Uncertainties and abilities of customers and suppliers .....	60
II.3.2	Designing offerings: developing the promise .....	64
<b>III.</b>	<b>DEVELOPMENT AND INNOVATION THROUGH RESOURCE</b>	
<b>INTERACTION</b> .....		<b>73</b>
Introduction.....		73
III.1	Presentation of technology.....	74
III.1	Interaction of resources for technological developments .....	77
III.1.1	Four type of resources developed in interaction.....	79
III.2	What makes SMEs different in this way of interpreting technological development.....	83
III.3.1	The advantages of being small .....	87
III.3.2	Networking and crossing relationships to accelerate the innovation process .....	90
<b>IV.</b>	<b>THE CASE STUDY: PROSILAS S.r.l.</b> .....	<b>93</b>
IV.1	Methodological notes .....	93
IV.2	Prosilas: an overview of the company .....	94
IV.2.1	History of the company .....	96
IV.2.2	Structure of the company, and the key people.....	100
IV.3	The relationship with EOS and its evolution.....	102
IV.3.1	EOS GmbH.....	103
IV.3.3	The intensification of the relationship between Prosilas and EOS.....	109
IV.3.4	People involved in the supplier-customer relationship.....	112
IV.3.5	The atmosphere of the relationship .....	115
IV.3.6	The technical cooperation on the EOS P 770 .....	120

IV.4 The partnership with 4D Engineering for the CAD design .....	122
IV.5 The relations with other 3D service centers .....	123
IV.6 Universities and the activity of R&D .....	124
<b>V. ANALYSIS AND CONCLUSIONS .....</b>	<b>128</b>
V.1 Some considerations about how the relationship has developed .....	129
V.1.1 The pre-relationship stage. ....	130
V.1.2 Developing the relationship .....	132
V.1.3 Long-lasting relationship marked by cooperation .....	138
V.2 Some remarks about the key interactive episodes .....	139
V.2.1 ‘First test-taker’: Prosilas as “lead user”. ....	139
V.2.2 ‘Media collaboration’ for developing solutions jointly .....	143
V.3 Some observations about critical aspects of the relationship.....	147
V.3 Final conclusion .....	148
<b>REFERENCES.....</b>	<b>146</b>
<b>SITOGRAPHY.....</b>	<b>156</b>

## INTRODUCTION

This thesis is placed in the field of Supplier Relationship Management studies. In particular this work will deal with the importance of having a close working relationship with the supplier for developing purposes.

Due to the highly competitive business environment, the success of a company no longer resides into the abilities, resources and performances of a single company, rather, it depends also on the abilities, resources and performances of its suppliers. It becomes especially true when the offering of a company embeds complex technologies whose development depend on its suppliers.

The tendency of companies in shifting from a *buying orientation* toward *supply management* is the proof that companies are getting aware that their success depends also on the resources and the competencies of their “base of suppliers”, that are those suppliers to whom is recognized great strategical importance.

The aim of the study is to figure out in which way the resources, the competencies and the know-how of a supplier can contribute to the development of a business customer. To do so, the study will adopt the *network approach*, which is a perspective proposed by the *Industrial Marketing and Purchasing Group (IMP group)* for the analysis of the business to business markets. The relevance of this study stems from the fact that it places itself in a new methodology of research employed and promoted by the IMP community. It consists in the collection of qualitative data, through the use of a case studies, for tracing the key moments of the interactive episodes that take place between the actors of the network, for

roughing out a rich and complex image of the interactive phenomenon itself. Being the focus of this thesis on the role of the supplier in the development of the customer, the data collected regards the interactive episodes that have been taking place at the dyadic level, thus between customer and supplier. The case study concerns the experience of a small Italian company operating in the additive manufacturing industry that, from previous studies, has shown to have developed across the years a close working relationship with its single supplier of Selective Laser Sintering technology. The analysis will use this business relationship as the object of observation and will draw some conclusion about the role that this relationship has had in the development of the customer.

In the first chapter it will be presented the theoretical framework of the subject matters that will be the object of this thesis. The chapter will start by retracing the evolution of the industrial marketing discipline from the early 70s until the present day. Then, it will be presented the *Industrial Marketing and Purchasing Group (IMP)* of which will be discussed a brief story and the principal theoretical constructs. The chapter will conclude with the introduction of the *interaction and network approach*, which will constitute the main theoretical point of departure of this study. It will be integrated by the explanation of the principal concepts proposed by the IMP group, such as network, interaction and business relationship.

Later, in the second chapter, it will be tackled the issue of purchasing in the network. The chapter will start by analyzing the classification, the features and the development process of customer-supplier relationships. Then, it will be discussed the strategic importance that the relationship with the supplier has been acquiring in the last thirty years and the problem that business customers want to solve when they decide to purchase. The chapter will end

by examining the dynamics that characterize the customer-supplier interaction for the designation of the offerings.

The following chapter will face the issue of technological development in the interaction between customer and supplier. After a brief presentation of the concept of technology, the chapter will focus on the “4R model”, a framework developed by IMP group’s researchers in which technological developments are studied focusing on the interaction among resources. It will be followed by the presentation of the advantages of being small in the interaction of resources, then, the chapter will end by presenting two studies, from the IMP group database, that deal with the innovation process of small companies.

In the fourth chapter, it will be presented the case study. It will start by giving an overview of the customer, Prosilas, and the supplier, EOS. Then, the focus will shift on the business relationship between the additive manufacturing services provider and its supplier of 3D printers. In doing so, it will be presented the features of the relationship and the episodes that have marked its process of development. The case study will be completed by the discussion of other important business relationships.

In the final chapter, it will be presented the analysis of the case study. The analysis will be divided into two parts. The first part will analyze the process of development of the business relationship, while the second will analyze the interaction process by looking at some key episodes. The analysis will be integrated by some observations that aim at a deeper understanding of both the development of the relationship and the interaction processes. Finally, some general consideration will be made regarding the function of the relationship as a source of development.

## INTRODUZIONE

Questo lavoro di tesi si colloca nel filone di studi riguardante la *Gestione delle Relazioni con i Fornitori*. In particolare, questa tesi affronterà l'importanza di avere una stretta relazione di lavoro con il fornitore al fine di sviluppare il business.

A causa del contesto economico altamente competitivo, il successo di un'azienda non risiede più nelle capacità, nelle risorse e nelle prestazioni di una singola azienda, ma dipende anche dalle capacità, dalle risorse e dalle prestazioni dei suoi fornitori. Questo diventa particolarmente vero quando l'offerta di un'azienda incorpora tecnologie complesse il cui sviluppo dipende dai suoi fornitori.

La tendenza delle aziende a passare da un *approccio all'acquisto* ad un *approccio strategico* nei confronti dei fornitori è la prova che le aziende stanno diventando consapevoli che il loro successo dipende anche dalle risorse e dalle competenze della loro "base di fornitori", che sono quei fornitori ai quali è riconosciuta una grande importanza strategica.

Lo scopo di questo lavoro di tesi è quello di capire in che modo le risorse, le competenze e il know-how di un fornitore possano contribuire allo sviluppo di un business. Per fare ciò lo studio adotterà la *prospettiva network* proposta dall'*Industrial Marketing and Purchasing Group (IMP)* per l'analisi dei mercati business to business. La rilevanza di questo studio deriva dal fatto che si colloca in una nuova metodologia di ricerca adottata e promossa dalla comunità IMP. Questa consiste nella raccolta di dati qualitativi, attraverso l'uso di un case studio, per identificare i momenti chiave degli episodi interattivi che si

svolgono tra attori del network, per dare forma ad un'immagine ricca e complessa del fenomeno interattivo stesso. Essendo il focus di questa tesi sul ruolo del fornitore nello sviluppo del business del cliente, i dati raccolti riguardano gli episodi interattivi che si sono verificati a livello diadico, quindi tra cliente e fornitore. Il caso studio riguarderà l'esperienza di una piccola azienda italiana operante nel settore della manifattura additiva che, da studi precedenti, ha dimostrato di aver sviluppato negli anni uno stretto rapporto di collaborazione con il suo unico fornitore di tecnologia di sinterizzazione laser selettiva. L'analisi utilizzerà questa relazione commerciale come oggetto di osservazione e trarrà alcune conclusioni sul ruolo che tale relazione ha avuto nello sviluppo del cliente.

Nel primo capitolo verrà presentato il quadro teorico generale dei temi che saranno oggetto di questa tesi. Il capitolo inizierà ripercorrendo l'evoluzione della disciplina del marketing industriale dai primi anni '70 fino ai giorni nostri. Successivamente, verrà presentato l'*Industrial Marketing and Purchasing Group* di cui verrà discussa una breve storia e i principali costrutti teorici. Il capitolo si concluderà presentando l'*interaction e network approach*, i quali costituiranno i punti teorici di partenza di questo studio.

Più avanti, nel secondo capitolo, verranno affrontate le tematiche relative all'acquisto nel mercato a rete. Il capitolo inizierà analizzando la classificazione, le caratteristiche e il processo di sviluppo delle relazioni cliente-fornitore. Successivamente, si discuterà dell'importanza strategica che il rapporto con il fornitore ha acquisito negli ultimi trenta anni e del problema che i clienti business vogliono risolvere quando decidono di acquistare. Il capitolo terminerà esaminando le dinamiche che caratterizzano l'interazione cliente-fornitore per la progettazione dell'offerta.

Il capitolo seguente affronterà il tema dello sviluppo tecnologico nell'interazione tra cliente e fornitore. Dopo una breve presentazione del concetto di tecnologia, il capitolo si concentrerà sui "modello delle 4R", un modello sviluppato dai ricercatori del gruppo IMP in cui vengono studiati gli sviluppi tecnologici concentrandosi sull'interazione tra risorse. Seguirà la presentazione dei vantaggi che caratterizzano le piccole imprese nei processi di interazione delle risorse, quindi il capitolo si concluderà presentando due studi, estratti dal database del gruppo IMP, che trattano il tema del processo di innovazione delle piccole imprese.

Nel quarto capitolo verrà presentato il caso studio. Si inizierà fornendo una panoramica del cliente, Prosilas, e del fornitore, EOS. A seguire, l'attenzione si sposterà sul rapporto commerciale tra il fornitore di servizi di manifattura additiva e il suo fornitore di stampanti 3D. Verranno presentate quindi le caratteristiche della relazione e gli episodi che hanno caratterizzato il suo processo di sviluppo. Il caso studio sarà completato presentando un quadro generale delle relazioni di business della Prosilas.

Nel capitolo finale verrà presentata l'analisi del case studio che sarà divisa in due parti. La prima parte analizzerà il processo di sviluppo del rapporto di business, mentre la seconda analizzerà il processo di interazione commentando alcuni episodi chiave. L'analisi sarà integrata da alcune osservazioni che mirano a una comprensione più approfondita sia dello sviluppo della relazione che dei processi di interazione. In fine, verranno presentate alcune considerazioni generali sulla funzione della relazione come fonte di sviluppo.

## **I. B2B MARKETS: THE INDUSTRIAL NETWORK APPROACH**

### **I.1 Evolution of the Industrial Marketing Schools of thought**

The Business to Business market is conceived as the palace where demand meets supply of industrial goods. This market is characterized by the fact that the exchanges take place between organizations; for this reason, it is also called either “inter-organizational market” or “industrial market” or “business market”. The actors who operate in these markets can be either institutional or economic organizations. The business to business market constitutes the reference market of the so-called *Industrial Marketing*.

Until the '80s, the *industrial marketing* was mainly seen as a derivation of the *consumer marketing*, the most traditional and consolidated discipline that aims to examine the markets in which the clients are the final customers – individuals or families. In it there were in force the principles, the methodologies and the techniques of the traditional marketing models which were thought for the customer markets with some exceptions made for the *peculiarity of the exchanged good* – industrial instead of large consumption – *and the purchase behavior* – that of organizations instead of individuals. Both discipline and managerial practices, for

the analysis of the business to business markets, adopted the same approaches and the same tools that were adopted for the consumer markets.

From the '80s onward, different schools of thought have been developed which have tried to elaborate autonomously and differentiate marketing management models specific for the business to business market and the firms that operate in it. The need to develop a new dedicated approaches for the analysis of business market arose when it was understood that, on the one hand, the business clients have their own characteristics which require the understanding of not only the *purchase behaviors* but also of the *nature of the purchase*, and on the other hand, that is not the nature of the product that differs between the consumer and the business market, but it is the *type of exchange* which makes the two types of markets different (Tusini, 2017).

Various aspects make the *peculiarities of the business customer* different from the one of consumer clients:

- They are characterized by professional features;
- The purchased product has to be considered as an input of the client's production activity;
- Different inter-organization actors are directly or indirectly involved in the buying decision processes;
- The purchase process is influenced by functionals and economics parameters.

Regarding the *nature of the exchange* that takes place in business markets, it appears purely as a relationship exchange, rather than a transactional one, characterized by repeated, durable and sometimes complex interactions (Johanson, Mattsson, 1987; Ford et al., 2013).

Even though, starting from the '80s, the relationship aspect of the business to business exchange became increasingly important in the studies of the business markets, in the first following decade some schools of thought, especially those of American origin, tried to maintain a continuity with the traditional marketing model (Webster, 1992); others, in particular those European of Scandinavian derivation, elaborated new and original approaches that stood out significantly and critically from the American ones. Only from the middle of the '90s there was a convergence between the two schools.

Nowadays, the discipline of Business Marketing has been definitely consolidated and, rather, for certain analytical and interpretative models, it has started to be a landmark also for Consumer Marketing.

## **I.2 IMP Group Perspective on Business Markets**

In the middle of the '70s, the European Industrial Marketing school of thought was strongly influenced by the American models that did not contribute to giving valid tools to the European researchers for a deep understanding of the industrial market. The weak contribution of the American models was due to a variety of factors

related, for example, to the conceptualization of the industrial markets and the commercial exchanges, and the methodology of the studies.

It was in this “turbulent” context, characterized by a lack of tools for examining the industrial markets, that a group of studies was informally constituted in Sweden at the Uppsala University with the name of ‘Industrial Marketing and Purchasing Group’ (IMP).

The aim of the IMP group was to analyze the functioning and the processes that characterized the industrial markets, with a focus on the study of the dynamics that marked the exchange processes between international industrial organizations.

In order to come up with the right tool for the understanding of the industrial markets, the group of studies sketched out an international program of research intended to investigate the exchange process between private firms. The focus was on which were the main problems during the development of business activities from the standpoint of both the buyer and the seller. The modus operandi was to observe the empirical reality of the industrial market to interpret the phenomenon. To this purpose, they directly observed a substantial number of firms, and for each of them more than one person was interviewed<sup>1</sup>.

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<sup>1</sup> As it is represented in the volume, that is freely downloadable from the IMP Group website, the firms that took part to the research were 274 (67% in the selling position and 33% in the buying position) from five different countries (France, Germany, Italy, Sweden, United Kingdom) and for each firm, on average, 3.2 people were interviewed. Thanks to the elaboration of this model of study of the inter-organizational relations, the research obtained the eulogy from the European community of industrial marketing.

The outcome of this extensive research was published in 1982 by Håkan Håkansson in a volume entitled '*International Marketing and Purchasing of Industrial Goods: An Interaction Approach*'. In this volume, the author proposed a new way of examining the industrial market, the *interaction approach*, and developed the related framework called 'Interaction Model'. What emerged from the study was that the majority of the analyzed firms were used to develop long-lasting business relationships with the counterparties. Furthermore, these relationships seemed to be unique and different from each other.

The starting point of the research program was to challenge the traditional way of examining industrial marketing and purchasing. The theoretical idea behind the approach proposed by the Swedish group of researchers can be outlined in four main points (Håkan Håkansson, 1989):

1. Instead of a narrow analysis of a single discrete purchase, as suggested by the traditional industrial buyer behavior literature, it is essential to consider the *importance of the relationship* that exists between buyers and sellers in the industrial markets. It is often close, and it may also be long term and involve an intricate pattern of interaction episodes between the two companies.
2. Actors in the industrial market are not passive, thus the market does not accept passively the 'marketing mix' manipulated by every single actor. Contrariwise, it is needed to examine the *interaction* between individual

buying and selling firms where both firms may be taking a more active part in the transaction, thus in the definition of marketing levers.

3. The atomistic view of the industrial market structure assumes a large number of buyers and sellers who act in a disorganized and frenetic way that may change between different suppliers for each buyer. On the contrary, the industrial market seems to be characterized by *stable* relationships between buying and selling firms.
4. The traditional economic analysis of the market is based on the separate examination of the process of industrial purchase or industrial marketing. In contrast, both processes, if analyzed from a relational point of view, show *similarities of the tasks for both buyers and sellers*.

The main contribution of the 'Interaction approach' (Håkansson, 1982) to the industrial marketing discipline was to bring out the central role of both *interactions and business relationships*. It came to light that to grasp the complexity of the industrial market, it was essential to understand the interaction process that characterizes the relationships in the business markets.

Even though this model adopted a new marketing perspective, the relational, that was totally different from the ancient views, it allowed only a partial understanding of the business market, inasmuch it was overly focused on the single buyer-seller relationship.

To overcome the limitation of examining the dyadic relationship singularly, starting from the middle of the '80s, the IMP group dedicated itself to the second branch of research for further developments of the 'interaction approach' with the aim of understanding how the single dyadic relationships were linked among them. In other words, it seemed necessary to conduct further in-depth analysis, both theoretical and empirical, taking into account the context of reference and the external environment of the firms.

Adopting the relationship perspective, the IMP group carried out studies in order to better understand how firms interact and relate to each other. In 1989, the two components of the IMP border, Håkansson and Snehota, published the article '*No business is an island: The network concept of business strategy*' in which they argued that companies born, develop and operate under 'network conditions' (Håkansson and Snehota, 1989). What the two researchers suggested was that companies, their counterparts, activities, and resources are connected to each other through business relationships, interactions and interdependencies. Even if the article was framed in a field of study different from that of the industrial marketing, it provided valid theoretical instruments for a more extended development of the IMP Interaction Model, indeed, these were the basic concept of the new model on which the IMP was working on for the description of the industrial markets. Meanwhile, other authors were giving more considerable attention to the context within which the dyadic business relationships take place. Anderson et al. (1994)

suggested that “the identity of the firm is embedded in the network through its relationships, which are connected to each other”.

At the beginning of the '90, the IMP group published the volume ‘*Developing Relationships in business network*’ edited by Håkan Håkansson and Ivan Snehota in 1995. It was revolutionary because for the first time the concept of the network was used for describing the complexity of the business market. In this book, the two founders of the IMP group presented and discussed the innovative model for the examination of industrial markets, the *Industrial Network Approach* (Håkansson and Snehota, 1995). In essence, this approach is an extension of the interaction approach, and suggests that although the relationships are dyads, they should be viewed as being part of a network. It follows that industrial markets are networks – *market-as-network* - in which exists a superstructure of interdependent actors, resources and activities linked by business relationships. These interdependencies, depending on the intensity, could turn out to have a positive or negative effect on the single organizations. It means that, contrary to what is claimed by the traditional models, *firms are not independent*, and they cannot manage relationship unilaterally.

According to this approach, business relationships are ‘quasi-organizations’ that allow the *actors* to exchange *resources* in order to develop economic *activities*. In the same manuscript, it was presented the related conceptual framework describing the complex interdependencies that exist between relationships in network contexts,

‘the Actors-Resources-Activities model’ (ARA model) (Håkansson and Snehota, 1995).

The conceptualization of the network approach extended the understanding of the interaction among the actors of the industrial market strengthening the concept of business relationships and developing the new one of network (Runfola, 2018). The IMP contributions not only presented a new structural view of the business market-as-network, but they also provided alternative models for examining the complex interdependences of business relationships and their management (Ford et al. 2011).

### **I.3 Interaction and Network Approach: The Models for Description and Analysis of Business Relationships in Business Networks.**

The network approach can be considered as a new paradigm that provides an alternative to the traditional microeconomic-based models for marketing and purchasing management.

The aim of this section is to present the conceptual and analytical models for understanding how the functioning of the industrial markets can be explained by adopting the network approach. Being the network-based view of the industrial market a complementary evolution of the interaction approach, it will be necessary to present the frameworks related to both approaches.

At the beginning of this section, it will be presented the concept of business relationships and it will be followed by the discussion of the features of the interaction model (Håkansson, 1982). Then, the discussion will focus on the

description of the framework elaborated for the comprehension of the business network, the 'ARA model' (Håkansson and Snehota, 1995).

### **I.3.1 The Concept of Business Relationship**

The experience of the IMP Group and other researchers carried out in Europe, Us and Japan have demonstrated that business transactions take place within long-lasting buyer-seller relationship, that are often stable, close and complex in nature (Håkansson, 1982; Ford, 1990; Gadde and Håkansson, 1993; Håkansson and Snehota, 1995; Johanson, Mattsson,1987). As anticipated earlier, the first IMP program of research underlined that each relationship is different from the others. It means that every seller needs to do business with many of its customers on an individual basis. Adopting this way of seeing the relationships in the industrial markets, it follows that the discipline of industrial marketing and purchasing needs to consider that both sellers and buyers deal with the same key problems: establishment, development, and handling of business relationships.

As underlined by Håkansson, besides the buyer-seller relationship, that can be defined as the heart of the industrial market, firms may be interested in developing relationships with other actors, such as research institutes, consultant agencies and so on. This is because the concept of relationship exchanges is not strictly connected with the concept of commercial exchanges, indeed, a company may be interested in establishing relationships for other purposes, such as the exchange of knowledge.

For this reason, firms may establish, develop and handle relationships with the supplier's supplier, customer's customer, competitor or manufacturer of complementary products (Gadde and Håkansson, 1993).

Despite the uniqueness of business relationships, numerous studies have tried to provide an overview drawing some repeated characteristics showing their common traits. These characteristics have been summarized by Håkansson and Snehota (1995) in two primary categories: *structural* and *process* features.

The characteristics that describe the *structural dimensions* - continuity, complexity, symmetry and informality - refer to the importance that a relationship has for a company. In essence, business relationships apparently are long-lasting, involve several people and several objectives, are in some way balanced and are based on trust and confidence. Although those features could lead to thinking that relationships are not dynamic, significant business relationships are continuously changing.

This dynamic dimension of the relationship is described by the *process characteristics* which are: adaptation, cooperation and conflict, social interaction and routinization. They describe what happens within a relationship. More specifically, those features describe the processes of: activity coordination, benefit-sharing process, mutual learning and institutionalization.

In the book 'Developing relationship in business network' (Håkansson and Snehota, 1995), the two authors have pointed out that large-scale studies, that have

involved hundreds of companies, describes a situation in which most industrial companies have only few customers and suppliers that contribute to the majority of the sales and purchases (Cowley, 1988; Perrone, 1989; Håkansson ,1989). Basically, it means that the performances of such companies depend on a limited number of relationships. It is essential to underline that the link between relationships and performances works in both ways, that is, the total performance depends on the performance of singular relationship as much as the capacity to perform in a singular relationship depends on the overall performance.

### **I.3.2 An Interaction Model**

By adopting the approach suggested by the IMP group (Håkansson and Snehota,1995), industrial markets are seen as places where business relationships are established, developed, managed and eventually may evolve into interactions. The examination of each relationship implies its decomposition into more straightforward elements. Håkansson (1989) proposed the ‘Interaction Model’ for the analysis of each dyadic buyer-seller relationship breaking it down in four central groups of elements:

1. The interaction processes;
2. The actors involved in the interaction;
3. The environment within the interaction takes place;

4. The atmosphere which affects and is affected by the interaction.

### The Interaction Processes

Two industrial actors interact with each other in order to transfer resources and/or perform activities. What makes the interaction different from the traditional concept of transaction is that the latter take place without the presence of a process, indeed the transaction is only a link that has no impact on the involved parties, because it does not have any own content. On the contrary, the *interaction is a process* that develops over time with its own content affecting both parties. This concept is graphically recapped in Figure 1.1.

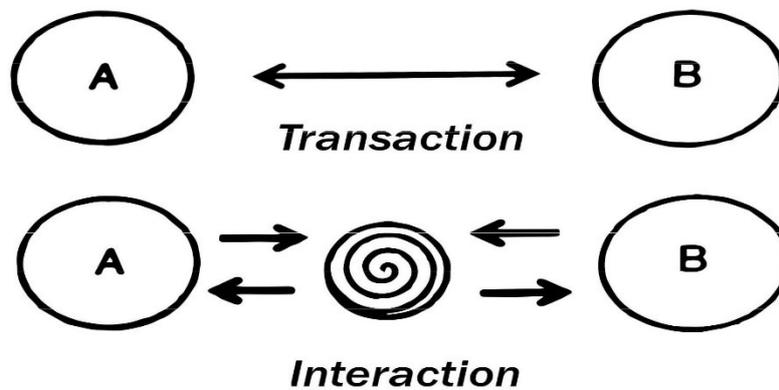


Figure 1.1 - Transaction and Interaction.  
Source: Ford et al. (2011)

The interaction itself has two dimensions, the (a) *exchange episodes* and the (b) *relationships*. The former explains what happens in the short-period, while the latter gives a long period views on the interactions.

(a) *Exchange episodes*. The *exchange episodes* refer to the frequent single interactive episodes of exchange that take place when two industrial actors decide either to transfer resources or to perform activities together. Each episode is not independent but constitutes an integrated aspect of the overall interaction process. The exchange episodes are discriminated on the base of the exchanged element. They can be: (i) product and service exchange, (ii) informational exchange, (iii) financial exchange and (iv) social exchange.

(i) *Product and service exchange*. Needless to say, the *product or service exchange*, especially in the buyer-seller relationship, is often the core of the exchange. The relationship may be influenced by the characteristics of the exchanged product and/or service.

(ii) *Informational exchange*. In a commercial exchange the products and/or services may be coupled with an *informational exchange* that concerns technical, economic or organizational aspects. The information can be impersonal, in the case of technical information, or personal, that is more likely to be used for the transfer of 'soft information' (e.g. conditions of the

agreement, information about the parties, etc.). The degree of formality with which this information is exchanged may affect the nature of the relationship.

(iii) *Financial exchange*. The quantity of money exchanged, which is the third element of the short-term relationship, is an indicator of the economic importance of a relationship.

(iv) *Social exchanges*. None of the above-mentioned exchanges can take place unless there are *social exchanges* that are going on. The social dimension of the interaction is essential because, in the long period, the succession of social exchanges solidifies the relationship interlocking the parties. In the short term, it helps the parties to avoid difficulties in managing a relationship in the period between each transaction. In general, social exchanges are needed for the building of mutual trust even though its development is also dependent upon the other exchanges.

(b) *Relationship*. The repetition of the above-discussed exchange episodes in the long period leads the two parties to build up a relationship that both affects and is affected by the single exchange episode. The relationship implies that the two parties have a clear expectation of the counterpart's role. These expectations may become *institutionalized* to the extent that these exchanges are not seen any more as the outcome of a decision-making process, but they may be considered as a

tradition of the organization. Another critical aspect of the long period interaction between firms is the *adaptation* which both parties of the exchange may make either in the *element exchanged or in the exchange process*.

### **The Actors Involved in the Interaction**

The interaction process depends not only on the elements and the processes of the interaction (the object of the exchange) but it depends also on the parties involved in the exchange (the subjects of the exchange). When considering the parties involved in the interaction, it should be taken into account both the characteristics of the organization and the individuals who represent them. The major factors which are essential to consider for analyzing the interaction are:

*(a) Technology.* The characteristic of the difference between the two technological systems give the primary condition for the interaction, in fact, the interaction can be seen as the connection between the technology produced by the seller and the application of this technology by the buyer.

*(b) Organizational size, structure and strategy.* The size of the organization may affect the power/dependency dynamic of the exchange, while the structure of the company may affect the procedure of exchange, the number of individuals involved in the interaction, the communications media, the formalization of the interaction and so on. It is essential to consider that in the long period the structure of the organization may be modified by either the business relationship or the single

episode. Concerning the strategical dimension, it is an important influencing variable of the relationship.

*(c) Organizational Experience.* The experience of an organization in a particular market may affect the capability of a company to establish a relationship with other companies operating in this market. It equips the organization with the knowledge for the management of the relationship. Every single relationship helps to increase the organizational experience which can be used in other relationships.

*(d) Individuals.* Being the organizations made up of individuals, in each exchange episode at least two individuals from each organization are involved. Personal characteristics, experiences, motivations and preconceptions of the individuals involved in interaction can affect the result of it. In addition, role, level and function of the central individuals involved in the interaction may influence the chances of future episodes.

### **The Interaction Environment**

The interaction processes cannot be analyzed without considering the context in which the interaction takes place. The firm's external environment is one of the critical variables inasmuch it may have an impact on the fate of the relationships. The dimensions of the context that the model takes into account are: the *structure of the market* in which relationships take place; the degree of *dynamism* of the context; the *position in the manufacturing channel*, because different position leads

to different direct or indirect influence on the strategy by several other actors; the *social system* in which the actors are used to operate; and the *degree of internationalization*. All these aspects are elements of primary importance because they may act as facilitators or obstacles to the evolution of a relationship.

### **The Atmosphere of the Relationship**

So far it has been discussed how the overall relationship is affected by a single exchange episode and the dynamics of institutionalization and adaptation in the long-period. At the same time, the relationship is influenced both by the characteristics of the parties involved in the interaction and by the elements that characterize the environment. Another variable that influences the evolution of the interaction between the two parties is the atmosphere of the relationship.

The atmosphere of the relationship can be seen as an intervening variable, that is, the variable that connect the other dimensions of the interaction model (interaction processes, interaction environment and interaction parties). It can be described in terms of *closeness or distance* between the two organizations that interact, the degree of *power-dependence* that the two involved organizations have on each other, the state of *conflict or cooperation* that exists between the actors, and the mutual *expectations* of the company involved in the relationship. There are different reasons beyond the establishment of a particular atmosphere instead of another. In general, the advantages or disadvantages of having a particular atmosphere are

related to economic and control dimensions. Having a closer and more collaborative atmosphere may allow the parties involved in the relationship to gain economic benefits, lower costs and improving the control over some critical parts of the environment. To sum up, the figure below schematically illustrates the Interaction Model and the main variables of it.

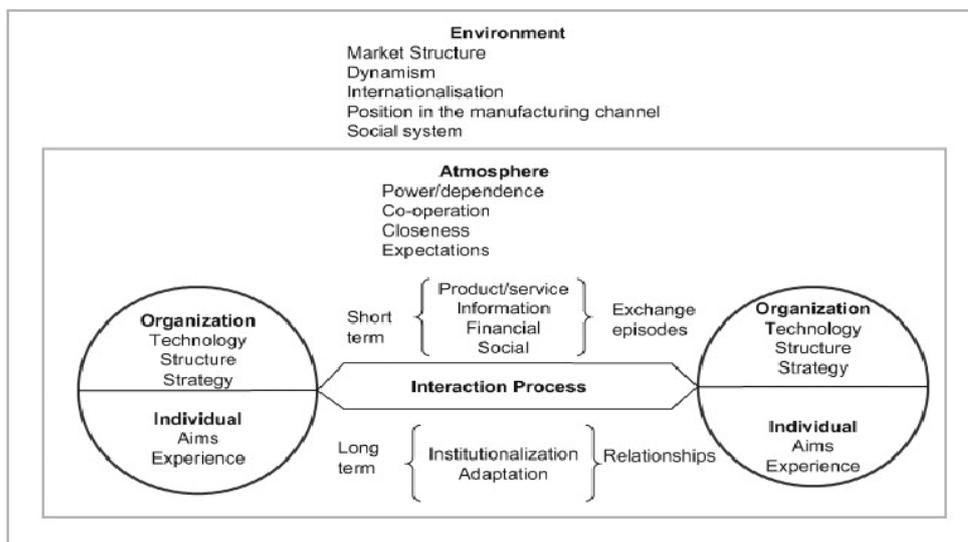


Figure 1.2 - Interaction Model.  
Source: Håkansson (1989).

### I.3.3 A Network-based Framework: ARA Model

The concept of business relationship is the notion that has been chosen to describe the interaction that takes place between companies in the business market (network). The reason beyond the use of the relationship's concept for describing what in the traditional models of industrial marketing was described as transactions,

lies in the fact that relationship recalls the ideas of mutual orientation, commitment over time, and interdependence existing between the actors involved (buyer and seller).

Even though each relationship is unique and singular, the model that will be explained tries to catch the *generally complex nature of the relationships*. As suggested by Håkansson and Snehota (1995), this complexity can be summarized in two main traits that seem to be in common in all buyer-seller relationships:

- The first concerns what is affected by a relationship and it is summarized in the concept of '*Substance of Relationship*'.
- The second dimension regards the effect that a relationship has for different actors, thus who is affected, and it refers to what the authors called '*Function of Relationship*'.

### **The Substance of Business Relationships**

What is affected by a relationship depends on several aspects such as the volume of exchanges and the variety of exchange elements. According to the model, three different elements, concerned with activities, resources and actors, can be identified in a relationship. In the following section it will be discussed how these elements are affected by relationships and for each of them will be indicated the '*layer of substance*' that can be identified in a business relationship.

The *activities* are performed within and between organizations. The relationship between two companies links the activities that are performed within a company with the activities performed by the counterpart. The connection, more or less close, of these activities has an effect on the way in which the two companies perform their own activities. Because of these interdependencies, a single change in one activity will have a kind of effect on other activities in the network. So, the first layer which builds up a business relationship in the industrial network is the *activity links*. It concerns technical, administrative, commercial and other activities of a company that can be connected to those of others as relationships develop. The result of linking is that the activities performed by the different companies become adapted and coordinated.

All companies need *resources* in order to perform activities. Basically, resources can be of five different types: input goods, financial capital, technology, personnel and marketing channels. These resources can be controlled by each company in two ways: directly, by owning them or having the right to use them; or, indirectly by having a close relationship with other companies that have the formal control of them. However, relationships between companies are not just a way to access resources, but in a relationship the resources of the two companies are combined, thus *resources ties* are the second layer of substance. More developed is the relationship, more resources combinations are likely to arise. Every relationship

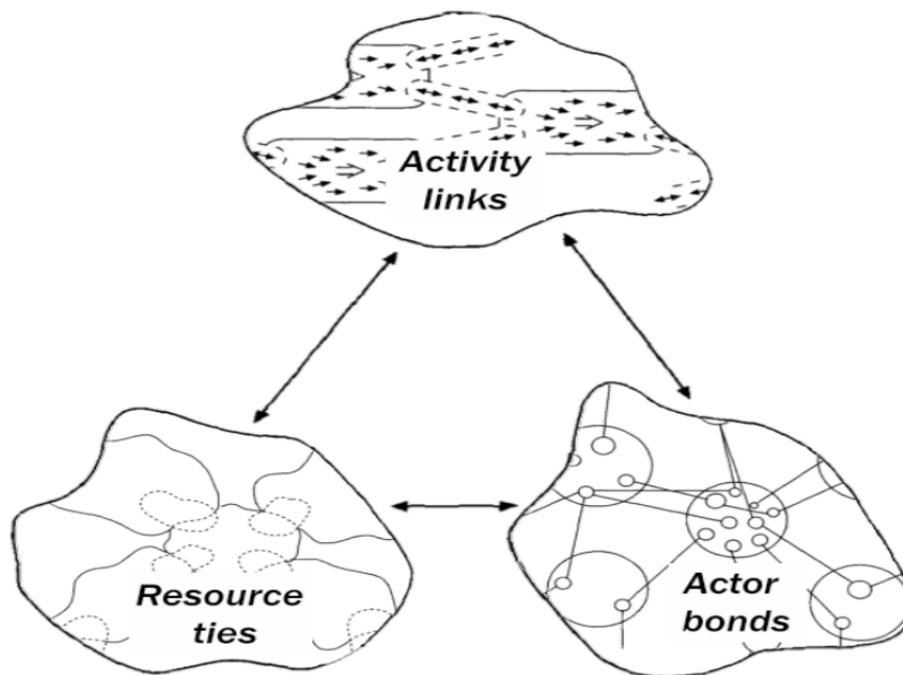
produces unique combinations of resources that could be used by both parties in other relationships.

All market participants are connected by network relationships. *Actors* exist at different organizational levels and they can be individuals, a group of individuals, business units, firms or a group of firms. However, actors of lower levels are part of other actors of higher-level. Actors usually act in combination with others, according to their goal, by combining resources to perform activities together. As said before relationship can be considered 'quasi-organization', in this sense, the boundary of each actor fade with the intensification of the relationship. *Actor bonds*, the third level of substance, are established in interactions and reflect the interaction process. They connect actors and influence how they perceive each other and form their identities in relation to each other. Actor bonds are the prerequisite for creating activity links and resource ties.

To conclude, the analysis of the substance of relationship it is important to underline that all of them are not independent, there is an interplay between the actor bonds, resource ties and activity links [Figure1.3].

*“Actors carry out activities and activate resources. Activities are resource-consuming and evolve as the capabilities of actors develop. Resources limit the range of activities an actor can pursue. The existence of bonds between actors is a prerequisite for them to actively and consciously develop strong activity links and*

*resource ties. Activity links make it likely that bonds can develop, and so on.”*  
(Håkansson and Snehota, 1995).



*Figure1.3 - Activity links, resource ties, actor bonds and the interplay among them.  
Source: my own elaboration of Håkansson and Snehota (1995)*

### **The Function of Business Relationships**

Relationships between two parties can have different functions and purposes, it is because they affect and are affected by both other actors and other relationships. Business relationships are part of a more prominent aggregate structure that is the business network and according to the industrial network approach, they have mainly three kinds of functions.

First, relationships always have specific functions as a junction between two companies, in other words it has a function in itself as a dyad. Links, ties and bonds which are created at the level of the dyad, give to the two organizations involved in the relationship the capability of perform activities and utilize resources that none of them could accomplish alone, it is called '*team function*'. So, the more the dyadic function is empathized, the greater is the positive impact of the team effect, and the higher are the opportunities to create new knowledge and achieve unique performances.

The second function of the relationship manifests itself for each individual actor. At this level, business relationships affect the performances of a company by leveraging on its activity structure, the collection of resources that it can use, and the organizational structure. The relationship itself can be considered as a resource that can be combined with other resources, internal or external, controlled by the company for the purpose of strengthening its innovativeness. In addition, the activity links contribute to the increase in productivity and the actor bonds affect the identity of each firm. In this sense, the relationship has a significant '*developing function*' for the individual company.

The last function lies in the role of the relationship for the network as a whole. Being the actor of the network interdependent, what happens in a dyadic relationship also affects third parties outside the relationship. It is because activity links and resource bonds in a relationship are connected, directly or indirectly, to other links

and bonds. The influences that the substance of the relationship has at network level can take the form of: activity pattern, that is the serial connection of activity links; resource constellation, which represents the directly or indirectly available resources in the network; and the network organization that represents the external boundaries of each network. It is important to underline that the network effect, or ‘*network function*’, can be positive, in the case a company is able to adjust its own activity links and resources ties in a way to exploit other relationship of the network, or negative, because existing relationship in the network may imply a limitation for the development of either actors or new relationships. Figure 1.4 summarizes the conceptual framework for analyzing business relationships in industrial networks.

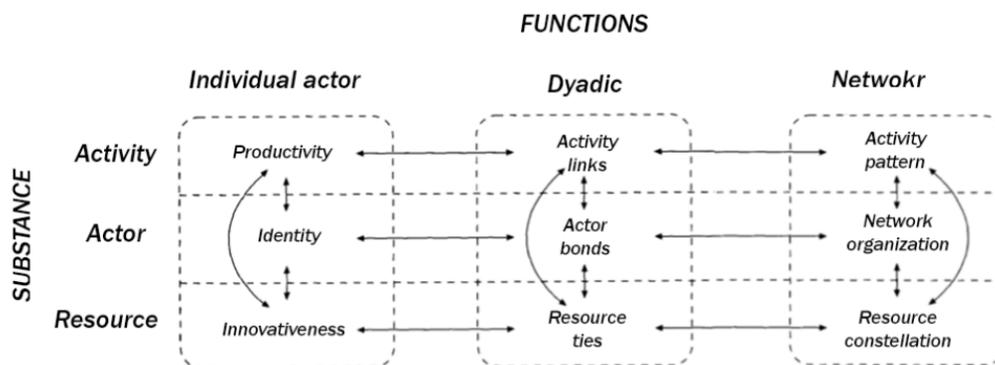


Figure 1.4 - ARA model. The summary of the conceptual framework  
 Source: an adaptation of Håkansson and Snehota (1995)

As it has been explained, each relationship can have different functions. For a company it is crucial to balance the function of each business relationship in order to avoid problems related to the dynamic of the network. The outcome of a business

relationship, for a given company, depends not only on how the questioned company acts in each exchange episode, but also on how the counterpart and the third parties connected with the given company act.

In order to prevent negative effects coming from this chain of acts, each company should correctly balance the functions of each relationship taking into account the circumstances, the centrality of the relationship, and the network structure. For example, putting too much emphasis on the dyadic team function could be harmful for the self-interest of one of the two parties; in the same way, too much emphasis on development function may destroy the team effect. At the same time, underestimate the network function could not let the company to see opportunities coming from the network or, worse, do not assess correctly the threats coming from it producing disastrous effects.

Managers have the crucial role of handle relationships in a way that positive outcomes should be for everyone, not only for his company or the parties involved in the relationship, but also for third parties of the network.

## II. PURCHASING IN BUSINESS NETWORKS

### **Introduction**

In the previous chapter it has been presented the network approach (Håkansson and Snehota, 1995), that represents the approach on which this thesis will examine the B2B market and its relationships. This approach emphasizes that between business organizations interactions, rather than transactions, take place when they get in touch for dealing. Relationships develop as a consequence of the interacting behavior of the parties involved in the exchange. It has also been argued that the establishment of these relationships creates interdependencies between the parties inasmuch, even if companies are free to set their own goals, they are severely constrained by others in trying to reach these goals. In fact, as has been said in the previous chapter, the substance and the function of each company's relationship affect its productivity, innovativeness and identity.

The aim of this chapter is to analyze the main features of buyer-seller relationships, analyzing it from the customer point of view. The chapter is basically divided into three parts.

The first part will look at the relationship from the “above”, trying to delineate the principal questions that both marketer and purchaser should know in order to manage the whole portfolio of relationships, and it is divided as follow: firstly, it

will be presented a model proposed by Campbell et al. (1985) that provides a useful link between the more traditional analysis of the business buying behavior and an approach that emphasize the interaction between buying and selling firms. Secondly, it will be presented the general features of a business relationship in order to describe, categorize and analyze supplier-customer relationships, it is based on the extensive study on supplier relationship that has been carried on by Håkansson and Gadde (1992). Thirdly, it will be time to introduce ideas on what happens in the relationship between customer and supplier and how those relationships develop, it will be done by presenting a work of Ford (1980). Fourthly, with the aid of Laage-Hellman (2002), it will be discussed some 'fit' dimensions that should exist between supplier and customer in order to let the relationship develop further in a well-functioning cooperative relationship.

The second part of the chapter aims to define the list of problems suggested by Gadde and Håkansson (1994) that companies want to solve when they deal with suppliers, this theme will be tackled. This theme will be introduced by reviewing three strategical issues that characterize the purchasing process.

Finally, the chapter will end by "entering" into a relationship and examining the interaction that takes place between suppliers and customers in the process of designing and developing the offering. Firstly, it will be presented the uncertainties and the abilities of the interacting parties that affect the definition of the problem

and the solution. Then, it will be listed the elements that build up an offering and will be analyzed the developing process of the offering.

## **II.1 Customer-Supplier Business Relationship**

Business marketers and business purchasers, as already said, face very similar tasks. Both need to establish, develop and manage relationships with a portfolio of companies, whether they are customers or suppliers. In other words, this means that business purchasers, and marketers as well, need to understand the nature and the dynamics of interaction, relationships and networks.

In order to be effective in the management of relationships, business marketers must understand the problems and the approach to the relationship of their purchasing counterpart. In the same way, business buyers must not only address their own problems, but be aware of the problems and the approach to the relationship of the companies from which they decide to supply themselves.

As said in the introduction, the problem faced by suppliers and customers will be discussed later on. Here, the debate will start by analyzing the approaches that suppliers and customers may opt for when dealing with each other.

### **II.1.1 The approaches to the relationship: the interaction strategy**

The interdependencies that exist among the actors of the business network come to light through business relationships that tie together companies. As has been pointed out by Campbell et al. (1985) interdependencies can be more or less strong, depending on the interaction strategy adopted by both parties involved in the relationship.

If the buyer plays the market and the seller has plenty of potential customers, none of them has an interest in being cooperative with the counterpart, and the result is that an *independent* relationship is established. On the other hand, *interdependencies* arise when both parties have interests in being cooperative with each other, they are both willing to establish a long-term relationship to exchange information openly and trust each other. Finally, a *dependent* relationship is established when one of the parties implements a strategy of command over the counterpart.

In other words, independent, interdependent or depended relationship depends on the approach that the parties have toward the relationship.

This classification of buyer-seller relationship has been presented by the authors as a new typology of categorization that was going to replace the old one proposed by

Webster and Wind (1972)<sup>2</sup>, it is for this reason that some authors believe that this model can be seen as a link between a more traditional analysis of the business buying behavior and an approach that emphasize the interaction between buying and selling firms (Ford, 2002). This new way of classifying the buying situation is in line with the network approach of marketing, which suggest that marketer should

		<b>Seller's strategies</b>		
		Competitive	Cooperative	Command
<b>Buyer's strategies</b>	Competitive	<b>Independent</b> Perfect market	Mismatch	<b>Independent</b> Seller's market
	Cooperative	Mismatch	<b>Interdependent</b> Domesticated market	<b>Dependent</b> Captive market
	Command	<b>Independent</b> Buyer's market	<b>Dependent</b> Subcontract market	Mismatch

*Figure 2.1 - Classification Buyer-Seller Relationship*  
*Source: Campbell (1985)*

use as the unit of analysis relationships instead of products (Ford et al., 2007). Figure 2.1 summarizes the typology of the relationship between buyer and seller depending on their respective interaction strategy (competitive, cooperative, command).

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<sup>2</sup> Webster and Wind proposed the classification of buying situation into new buy, modified rebuy and straight rebuy. This categorization was proposed in order to provide

Furthermore, the model for the classification of organizational buying behavior proposed by Campbell (1985) has overcome the disadvantage of the Webster and Wind (1972) model in that the latter was too much focused on the buyer's side. Instead, Campbell proposed a model in which was given equal weight to buyer and seller characteristics. As is clear from Figure 2.1, the type of relationship depends on the *interaction strategy* adopted by the parties involved.

In order to understand which conditions are favorable to a particular interaction strategy, Campbell (1985) has formulated a buyer-seller interaction model in which he has introduced the concept of interaction strategy and he has categorized the variables that affect it in three groups: characteristics of the buyer, of the supplier and of the product. The characteristics of the buyer and the supplier are divided into three sets of features representing the industry, the company and the individuals.

Starting from the *characteristics of the product*, in general interdependent relationships are likely to be established when transactions occur frequently. Switching costs also affect the interaction strategy of the parties, the higher are the switching cost due to physical and human investment<sup>3</sup>, the more likely the relationship is close. Further considerations on the characteristics of the product,

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<sup>3</sup> Sources of switching cost, from the side of the customer, could be related to the time needed to get to know supplier from both administrative and technical point of view, to the test of new products, to the training of own staff and to the changes that needs to be made in the offering (product, design or production method).

that are needed to be made in order to choose the more appropriate interaction strategy, concerns the complexity of the product exchanged<sup>4</sup>. In general, the more complex the product, the more interdependent the buyer-seller relationship.

Shifting on the *characteristics of the parties* involved in the relationship, what affects the choice of the interaction strategy is to be found in the features of the industry, the company and the individual.

Usually, in situations in which both supplier's and customer's *industries* are characterized by a high level of concentration, the parties tend to implement cooperative interaction strategy. On the opposite, relationships tend to be independent when the level of dynamism of both markets is high.

Looking at the physiognomies of the *companies* involved in the relationship, the approach to the relationship may be affected by the relative size. Of course, big companies tend to adopt command strategies. Also, the level of technology may affect the approach, in fact buyers who are familiar with the technology of the supplier are inclined to implement competitive or command strategy in their purchasing behavior.

Finally, the typology of the relationship must ultimately depend on the characteristics of the *people involved* in it. In fact, it is also up to those people the style of relationship. Some prefer cooperative strategy others do not. In general, as

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<sup>4</sup> Homse (1981) has identified six sources of complexity: functional, manufacturing, specification, application, commercial and political.

emphasized also by the IMP Group interaction model (Håkansson, 1982), the intensity of the interaction depends on the level of motivation and experience. In addition, Möller (1981) includes buying-related knowledge and interindividual behavior.

Table 2.1 lists the conditions that may push buying organizations to adopt a determined buying strategy.

*Table 2.1 Condition favoring different buying strategies.  
Source: Campbell (1985)*

	<i>Competitive buying</i>	<i>Cooperative buying</i>	<i>Command buying</i>
Product characteristics	Low or high frequency of purchase Low switching costs (standardized product) Product performance can be precisely specified	High frequency of purchase High switching costs (customized product) Product performance difficult to specify	High frequency of purchase High switching costs Products can be specified but is customized
Industry characteristics	Supplier's industry fragmented  Intense price competition among suppliers High rate of technical change Tradition of competitive buying	Both industries are concentrated  Stable competitive situation in each industry Low rate of technical change Tradition of cooperative buying	Buyer's industry concentrated but supplier's industry fragmented  Average level of competition  Low rate of technical change Tradition of command buying
Company characteristics	Buying company is larger than supplier Buying company prefers competitive buying Buying company lacks familiarity with the product (new buy)  Centralized buying organization	Both companies are similar in size Both companies seek a cooperative relationship Both companies are familiar with each other and respect each other's technical knowledge Organizational structures are similar	Buying company much larger than supplier  Buying company prefers to dominate supplier's costs and technology Buying company is familiar with suppliers  Buyer has more professional organization than supplier
Individual characteristics	Product perceived as important by buyer Buyer is not risk averse for this purchase Individuals who interact do not know each other well Buyer prefers competitive buying approach	Product is perceived as important by both parties Buyer is risk averse for this purchase Individuals who interact know each other Both buyer and seller prefer a cooperative relationship	Product is important to buyer Buyer is risk averse for this purchase Individuals know each other personally Buyer prefers a command strategy and supplier accepts cooperative role

Campbell (1985) with the buyer-seller interaction models has provided to managers useful guidelines for their action classifying marketing and purchasing behaviors into three interaction strategies. As will be seen later, the approach to the

relationship that the parties adopt, also affects the capability of the parties to formulate an offering that is able to solve the problem of the customer successfully.

### **II.1.2 General features of customer-supplier relationships**

Once defined the approach to the relationship of both parties that define the resulting type of relationship, more or less interdependent, it is crucial for marketers and buyers to deal with relationships on an individual base.

This is because each business relationship may differ significantly from one another. On the one hand, there might be simple deals in which the products and conditions are highly standardized, and a limited number of people are involved in the exchange. On the other hand, there might be exchanges in which a large number of people from different areas of the buying company have contact with people in the corresponding position at the selling firm, in this case is likely that complex problems need to be faced and solved. Between those two cases there are thousands of other possible configurations of exchanges.

Håkansson and Gadde (1992) have identified six general characteristics of buyer-seller relationships that need to be considered while examining interactions between actors of the network.

- a. *The complexity of a relationship.* Dealing with other companies may be complex from technical, organizational, and social points of view. In extensive buyer-supplier relationships, in which there are dense interactions

between different departments of both companies, it is required a high degree of co-operation. The complexity is also attributable to the fact that relationships affect each other, because a company may solve a problem with a supplier creating a new problem with another supplier.

b. *The long-term nature.* Relationships have to be evaluated considering that they are frequently long-lasting. Each relationship has related cost and revenue, the former relates to contact/information and adaptation, the latter related to rationalization benefits and contribution to technological development. If the structure of the customer-supplier relationship's cost/revenue is analyzed, it is evident that relationships have some of the same characteristics as investments. In addition, long-term relationships may be considered as resources (Håkansson and Waluszewski, 2002).

c. *Adaptation.* The degree of adaptation required by each relationship stands in direct proportion to the differences between the parties: the greater the differences the greater the adaptation required. Adaptation has mainly three aspects. The first concerns the type of adaptation, it can be technical, knowledge-based, administrative, legal and economic. The second aspect regards the differentiation between major adaptations, that are strategically important and occur on isolated occasions, and the incremental adaptation, that are natural adaptations, aimed to facilitate the collaboration between partners. Finally, the third aspect concerns the demand for and the content

of adaptations. Demand for adaptation may come from either supplier or customer, or even adaptation may come from both parties and their interaction. The content of the adaptation may concern both the technological structure of the companies and the products involved.

d. *Trust rather than formality.* Relationships are social processes in which confidence-building activities are essential. Business relationships always contain uncertain, and formal agreement cannot cover all conceivable situations. The process of trust-building requires time. Trust is alimented by frequent interactions, adaptations, high degrees of involvement, and relationship-specific investments. Most technological collaborations between companies take place without an explicit formalized agreement, thus they are based on the trust that the two companies have on each other.

e. *Power and Dependence.* It is a critical aspect of relationships. In the past, purchasers had the object to act in a way that dependencies would have not arisen. Nowadays interdependencies are accepted, and the objective is to handle them. Balanced or unbalanced relationships do not depend only on the partners' actions or strategies, but they can also depend on the general state of the economy. During a recession, buyers may have move power and vice versa.

f. *Conflict and Co-operation.* The parties of a business relationship have different interests. Some of them are contradictory, others are shared. Have

a good working climate between buyers and suppliers does not mean that they do not have any conflicting interests, but it means that both parties are able to deal with them in order to do not let conflict arise. Of course, effective relationships require some collaborations, but sometimes they can require an equal level of conflict or friction.

Considering the examined features of a business relationship, Håkansson and Waluszewski (2002) have compared the interaction between companies to the interaction between human life. David Ford in its works, stressing on this analogy has provocatively argued that business relationships are like marriages. Neither of them can be directed by one of the participants, neither of them can be foretold or planned by either of the participants involved in it, both of them can decline, become inert, be superseded by other relationships or fail completely, and neither of them suddenly comes into being (Ford et al., 2007).

### **II.1.3 The development of the buyer-seller relationship**

Although the relationships that tie together customers and suppliers in the industrial market can take innumerable forms, one of the things they have in common is that relationships are composed of a set of episodes that are interconnected over time with each other. Some relationships may last for a long period of time even if they are not always characterized by the same intensity, number, quality of the episodes.

Every business relationship is characterized by a life-cycle (Dwyer et al., 1987; Ellram, 1991; Terawatanavong et al., 2007). Throughout its lifecycle the features of a relationship may change and the management levers that can be used by the actors may have different connotations depending on the stage of the life cycle (Ford et al., 2011).

According to Ford (2001) buyer-seller relationships are established and developed over time going through five stages: *pre-relationship, early, development, long-term and final*. The following section explains the different stages of the relationship life-cycle:

1) *Pre-relationship stage*: in this phase both buyer and seller, can try to establish a relationship with a new customer or supplier. At this stage, the company's evaluation of the partner takes place without any kind of commitment to him. Evaluations of the relationship are conditioned by three factors: experience in existing and past relationships; uncertainty related to the perceived cost and the benefit of the relationship; and social, technological, cultural, geographical and time perceived distance between the parties. At this point the distances are substantial and the confidence is minimal.

2) *Early-stage*: at this stage the two parties are in contact to negotiate or developing specifications. Simple delivery can take place. The management time invested in the relationship aims to create experience and to reduce the

distances. At this point, the level of commitment is still low because the perceived uncertain is still high, however some kind of adaptation may be made. During this phase, unbalanced power/dependence relation may affect the relationship because due to the unbalanced power the interaction takes different from in respect to situations in which there is a balanced distribution of power/dependence.

3) *Developing stage*: this stage occurs when the purchasing starts to be characterized by continuity. The developing stage is marketed by the increasing of the experience which turns in a reduction of uncertainty. Due to continuous exchanges and more intense interactions, the distances decrease and mutual adaptation, both informal and formal, may take place with an effect on the cost-saving. Reciprocal trust is built, and unbalanced power/dependency relation may be rebalanced through experienced tactics of the weaker party. The level of commitment increases, and it can be emphasized by the way the two parties organize the relationship, including the status of the involved people and the number of contacts.

4) *Long-term stage*: if the relationship has not been discontinued by any of either party, the relationship gradually changes, falling in the long-term stage. Here the companies are mutually important to each other. The considerable experience of the two companies in doing business together leads to the standardization of operating procedures. Even though the

uncertainty is minimum, problems may arise from the institutionalization of the routines, because it may lead the parties involved to believe that the counterpart is less responsive or uncommitted, however the actual level of commitment is maximum. The distances between the two organizations have been filled, in particular, social relationships become stronger and more complex, and the technological distance has been filled thanks to extensive formal adaptation. This situation may be a barrier to the entry of other companies.

5) *Final stage*: it is reached in a stable market where the processes that are part of the relationship have been fully institutionalized to a point where the conduct of business is based on industry codes of practice.

Understanding in which stage of the life-cycle a relationship is located, it is crucial for marketers and purchasers in order to rough out the general characteristics of the relationship and to identify the correct levers that need to be maneuvered in order to modify and orient the relationship.

#### **II.1.4 Conditions for establishing a well-functioning cooperation**

As will be seen, technological development in industrial networks often takes place between industrial organizations. When two companies, more or less consciously decide to cooperate, can achieve knowledge-creation through the mobilization of resources and the coordination of their activities. This creation of new knowledge,

that is the outcome of the interaction between two bodies of knowledge or a new interface of resources, can lead to the development of new technology or improvement of existing technologies (Ford et al. 2010). As it has been underlined by Laage-Hellman (2002) this interaction is particularly important when it takes place between supplier and customer. It is because the knowledge of how to manufacture a technology combined with the knowledge of how to use it, can lead the parties involved in the interaction to reach a higher level of innovation.

Laage-Hellman (2002) in its studies of how supplier and customer interact for technological development, has noted that in order to develop a well-functioning cooperative relationship, that is the “passe-partout” for fruitful combination and creation of resources, some kind of ‘fit’ between the two companies are needed. The author has distinguished four types of fits that may turn a business relationship in well-functioning cooperation, which may be precious for both participants to the relationship.

The four ‘fits’ that need to be considered while assessing the possibility of further developments of the relationship to turn it into a cooperation are: *functional fit*, *strategical fit*, *organization fit* and *time fit*.

*Functional fit* has to do with the extent to which two companies have complementary resources and activities. It can be improved by long term interaction between the two organizations, through learning and adaptation.

*Strategic fit refers to the fit that may or may not exist between two companies' strategies and long-term ambition, for example regarding the future position in the network. A common interest in developing and commercializing a certain product can be a strategic fit that may push buyers and sellers to collaborate for technological development.*

*Organizational fit has to do with organizational systems, companies' culture, management systems and so on. It can represent a prerequisite for starting the cooperation, and generally speaking, similarity in respect to this dimension can facilitate the cooperation.*

*Time fit is the fourth dimension and it refers to the willingness of the two parties to start a cooperative relationship. For example, if one of the parties has a resource fully employed in activities with a third party there may be no prerequisite for starting the cooperation.*

## **II.2 Relationship with the supplier**

In the last section of this chapter, it has been examined the relationship from the 'above'. What it will be examined in this part regards what kind of problems companies want to solve when they interact with the supplier. Before to do so, the discussion will be introduced by some consideration about how the supplier relationship has been evolved during the years.

The efficiency and effectiveness of any company are increasingly dependent on its supplier relationship. Choosing the right supplier is becoming more and more critical for the performance of a company. It is not only because companies tend to centralize their purchasing on a few numbers of suppliers, but it is also because nowadays companies depend on their suppliers for an increasing number of services related to the purchased products. In fact, companies nowadays depend on the supplier not only for the delivery of a piece of equipment to them, but also for the operation of that equipment throughout its working life. Statistically companies spend 50% of their turnover on purchasing.

In addition, due to the fact that companies need an increased number of diverse technologies in order to provide their offering, suppliers contribute also to the technological development of their customers and often are the primary source of knowledge and skill on which this technological development depends.

Gadde et al. (2010) pointed out that relationships with suppliers are important for, at least, two reasons: firstly, because purchasing tends to be for almost all companies the most significant expense item; and secondly, because the relationship with supplier plays a strategic role for the competitiveness of a company in that they exchange also strategic and complex activities and resources. For this reason, the main issue that managers face, is no longer to buy the right product, at the right time and right price, but the main challenge becomes to manage

the relationship with the key suppliers in order to make the most of them in the long period.

### **II.2.1 Suppliers relationships: three strategical issues**

Traditionally the purchasing function was seen only in perspective of gain efficiency in terms of costs. As affirmed by Dillforce (1986), purchasing decisions were mainly related to price considerations, and the idea of establishing several relationships of supply for a single item was considered the better way for achieving the lowest price and the highest assurance of secure flow of materials. This idea of purchasing has been criticized by different authors because it seems that this way of seeing the purchasing function does not allow for making direct use of the total resources of the supplier (Axelsson and Håkansson, 1984; Spekman, 1985). Contrary to what Dillforce (1986) has affirmed, Morgan (1987) has observed in its studies that an increasing number of companies were moving toward single sourcing, and even, deeper relationships with the single suppliers were emerging taking the form of alliances.

What will be presented in the following part are three strategical issues that reflect how the purchasing has been evolved moving away from the traditional view and gaining higher strategical importance.

The first issue regards the role of '*buy*' decisions when it comes to deciding whether externalize some activities or get access to some resources by relationship. The

second aspect concerns the *rationalization of the number of suppliers* and how companies tend to organize them. While the third aspect concerns the *nature of the relationship with the supplier*.

The first strategic issue is concerned with *make or buy decisions*. Even though this decision has been one of the major topics since the industrial activities were established, top managers seemed to consider make or buy decisions as not of strategic importance. During the years the approach managers have in evaluating these kinds of decisions has changed. In the discussion of the strategic importance of insourcing or outsourcing, Culliton (1942) concluded that in general “buying should be preferred to making”. This argumentation was supported by Hayes and Abernath (1980) that agreed with him advocating the strategic importance of buying decisions in order to not invest in asset-specific which could create problems for the innovativeness of a company. These considerations have been confirmed also by empirical studies (see e.g. Miles and Snow, 1986) that have observed the decreasing trend of formal vertical integrations (make situation). However, the reduction of vertical integrations has been replaced by informal arrangements to keep the network together. This is what is called “quasi-integration” (Blois, 1972), a mechanism that ties buyer and supplier firms through specific investment, joint development and various forms of financial supports. To conclude, Gadde and

Håkansson (1994) have observed a tendency to shift toward buying more from outside suppliers.

The second strategic issue concerns the *supplier-base structure*. Recognized the strategical importance of establishing relationships with suppliers, the second problem which managers face is: how many relationships need to be established and how to organize them. In sharp contrast with the traditional view of strategic purchasing, it has been noted that companies tend to establish single sourcing strategy. It was seen as a disaster in the traditional view because, according to it, companies that use a single source of supply lose the opportunity of price control and mitigation of risk. However, today it is possible to say that rationalizing the number of suppliers seems to have different advantages, such as the increased reliability of the supplier or the possibility of establishing efficient logistics systems.

Another advantage of reducing the number of suppliers can be noted in terms of the quality of the relationship with the supplier. In fact, more cooperative relationships with suppliers are possible only if the number of them is reduced.

The third strategical issue regards the nature of the relationship with the supplier. Anderson et al. (2009) have pointed out how the nature of the supplier relationship can be different on the base of the category of suppliers. The orientation that Anderson et al. (2009) underlined are mainly three: buying approach, procurement

approach and supply management. The first approach, closer to the traditional though, is the one which was predominant until the 80s, characterized by the fact that the buyer is focalized on the minimization of the price. This approach can be used for dealing with suppliers that provide products or services characterized by low technology complexity. The second, procurement orientation, begun to take hold to between the 70s and 80s when the international competition turned to the quality of the product and the production costs. This approach focuses on the quality of the product to buy and the procedure to which it is supplied. Contrary to the buying orientation, this orientation started to give more importance to those long-term relationships because only through those were possible to grab high-quality products and reliable services. The last orientation, the strategical approach, recognize the importance of suppliers' resources and competencies for the success of a company. It has started to characterize the customer-supplier relationship since the 90s and it has allowed the companies that have adopted this purchasing approach to optimize the process of developing and distribution of products. This way of seeing the relationship with the supplier allows the partners to integrate each other not only from the technical-operational point of view, but also from the technical-strategic one. This integration also allows to formulate and implement a joined strategy of innovation and business development.

## **II.2.2 Relationship with suppliers for solving problems**

The changes that have been described have turned the relationship with the suppliers of great strategical importance. They have become an important source or resource from which companies can draw on for the enhancement of their competitiveness that no longer resides with a company's own innate capability, but rather with relationships and linkages the firm can establish with external organizations (Lewis, 1995).

So, as emphasized earlier, managers should deal with suppliers not only with the aim of rationalizing costs, but also with the aim of getting access to the resources of the suppliers for developing purposes.

Ford et al. (2010) have drawn attention to the double contribution that well-established relationships with suppliers should confer to the buying organization. They are concerned, on the one hand, with the contribution of the supplier to customer's cost reduction and, on the other hand, with the capability of the suppliers' resources to contribute to the development.

### ***Supplier contribution to cost reduction.***

The rationalization is one of the customers' problems that push it to develop close relationships with suppliers. It concerns the need for a customer to carry on its operations as efficiently and economically as possible. This objective to reduce costs has to be considered in perspective across the relationship, and not only in

every single transaction. Moreover, what it is needed to take into account is not only the price paid, but also the hidden costs of the transaction, such as production costs, goods handling costs, storage costs, capital costs, supplier handling costs, administrative costs and development costs. All these indirect costs can be reduced through deeper cooperation with suppliers.

***Contribution of the supplier to development.***

Suppliers are essential not only for their contribution to costs' rationalization, but, as already said, they play a crucial role also in solving development problems of their customers. Indeed, through close relationships with suppliers, companies can rely on them as important sources of development resources. In close relationships, it is possible to identify and combine complementary resources, that is a way to achieve technological development. Furthermore, the interaction between the two bodies of resources, can generate innovations or technological development (Håkansson, 1989). This critical role of the suppliers has been enhanced by the increasing specialization of companies and the increasing technological intensity of their offering, that has made increasingly complex for a company to develop and maintain its own capability in each of the technologies on which it depends.

Regarding the role of suppliers as a source of development, Tunisini (2017) examines it deeper identifying three types of positive effects related to the development function of the supplier. They are:

- *Focus support*, that allows customers to focalize only on their key activities and competencies in which becoming an excellence and rely on more performing and innovative companies for complementary products and services in which the latter are the leaders.
- *Participation to the value co-creation process*, in that the relationship with the supplier can allow to the customer to access to specific or strategical resources and/or technological, useful for improvement in terms of quality, innovativeness and performance of their own offering.
- *Development of better network position*, relationships with suppliers contribute to the implementation of the positioning choices in the supply network. In fact, through close relationships with the suppliers, companies decide what kind of competencies and resources to control. From this point of view, suppliers' relationships contribute to the retention and the strengthening of positioning strategies of the customer.

In conclusion, relationships with suppliers are very central. They are crucial from an economic point of view, because a large proportion of the firm's activities are channeled through its suppliers. Secondly, having a collaborative relationship with suppliers can be essential from a technical point of view. In fact, through business relationships the technology of the suppliers is integrated with the customers' one. Thirdly, relationships between customers and suppliers are relevant from an

innovational point of view, because through relationships the knowledge possessed by a company can encounter other large bodies of knowledge.

### **II.3 Interacting with suppliers for designing the offering**

Rationalization of costs and development issues are the two *problems* that push companies to purchase. Managers are naturally preoccupied by the quality of their products and service, because product and service have always been seen as the solution of the customers' problems. But, focalizing too much on the products and service is a weak starting point of a successful resolution of a customer's problem. It is because products and services are simply what a marketing company supply, what really solve a customer's problem is what these can do for him. In other words, products and services are only part of the solution to the customer's problems.

Ford et al. (2007) have underlined that marketers, in order to be successful, should focus their attention on the *offering*, rather than product and service. The offering is the promise to the customer. The promise of delivering something that with some effort of the customer will solve, or at least allow the customer to cope with, a problem. The authors define the offering as “*a package or different proportion of physical products, services, advice, delivery and the costs, including the price that are involved in the using it.*” In the process of solving the customer problems, the authors have pointed out that there are two fundamental tasks associated with the offering; *designing an offering*, that is about developing the supplier promise to the

customer about how its problem will be solved; and *implementing the offering*, that is about fulfilling the supplier's promise to the customer. Secondly, they have noted that the effectiveness of the offering does also depend on customer's skills. Those skills are related with the capability of the customer to define and describe its problems, and with the capability of the customer to work closely with the supplier to develop and ensure the implementation of the offering.

At this point it is important to recall that the offering is developed neither by the supplier in isolation nor basing its features only on the specification of the customer. *The offering is developed interactively* in the relationship between supplier and customer, and can be considered as the *outcome of the business relationships*. It is for this reason that adopting the approach proposed by the IMP Group implies to consider that customer do not accept passively the offers provided by suppliers, but they actively influence the offering of the supplier.

In dealing with each other for the development and implementation of the offering, supplier and customer will face their own uncertainties and will bring their abilities to reduce the counterpart's uncertain. The offering can be seen as part of two systems of abilities and uncertainties: on the one hand, the abilities of the supplier are actively used for reducing the customer's uncertainties, on the other hand, the customer actively uses its abilities for reducing the suppliers uncertain. As it is

evident, marketers and purchasers deal with an interactive process rather than a transaction while dealing with each other.

In the next paragraph it will be presented an overview of the uncertainties and the abilities of the interacting parties.

### **II.3.1 Uncertainties and abilities of customers and suppliers**

There are situations in which to solve customers' problem is quite simple and liner, it is enough to purchase what it is needed. In these situations, the companies have clear what problem they have, they are also able to define what solutions are needed, and they already are involved in a relationship with a trustful supplier who can supply exactly what they need to solve their problems.

Other times, the purchasing process is characterized by numbers of uncertainties, and they are:

- *Need uncertainty*, it is related to the difficulty of the customer to define its own problem, or to be aware of the potential solution to it.
- *Market uncertainty*, even in the case customer recognize its problems and the potential solution, customers will often face a wide variety of potential solutions to a particular problem.
- *Transaction uncertainty*, it is related to the uncertain about whether the supplier will effectively implement its offering in time, in the right place, with the right performances and at the promised price.

These uncertainties related to the purchasing process for the customer's problem resolution, need to be reduced by the abilities of the supplier that are.

- *Problem-Solving ability*: that is the ability of the supplier to design and assemble an offering that will provide a solution to a customer's particular problem. All elements of the offering are important, but adaptation and advice are critical in the case customers have high market or needs uncertainties.
- *Transfer ability*, it is the ability of the supplier to moderate the transaction uncertain of the customer, and has to do with the ability of the supplier of fulfilling its promise.

As has been said earlier, customers need to bring their own skills in order to ensure the effectiveness of the offering. Customers need to use their demand and transfer abilities in order to moderate the uncertainties of suppliers that are related to capacity, application and transaction.

Starting from suppliers' uncertainties they are:

- *Capacity uncertainty*, has to do with how much of a particular type of offering it is likely to be able to sell in any time period
- *Application uncertain*, it is related to how the offering that they are able to produce can be most effectively used by customers and which type of problems they can best solve. This kind of uncertainty is related to the

effect that technological developments or applications change can have on the effectiveness of an offering. Only scanning a wide range of customers to observe how different customers are currently applying and are likely to apply in the future the offering, suppliers can act for moderate their application uncertainty.

- *Transactional uncertainty*, it is similar to the customer but this time from the eyes of the seller. In essence, if the customer is able to buy what it has been ordered.

These uncertainties are related to the customer capability to solve suppliers' problem that can be for example related to the cash-flow, the profitability or the innovation.

As it has been said, in the interaction the supplier uncertainties are counterweighted by the abilities of the customers that are:

- *Demand ability*, that is the ability that enables the customer to advise its suppliers about the *type* and the *volume* of offering it should produce. This ability moderates the capacity and application uncertainties of the supplier. It is crucial for supplier to deal with customer with high demand ability, because only in this way suppliers can, by interacting with its supplier, understand possible future applications of an innovative technology or new applications of its current technology.

- *Transfer ability*, in the same way of the supplier's transfer ability, it is related to the aspects that concern the management of the relationship. So, it is the ability to provide the promised volume and type of order and information to the supplier.

The uncertain and abilities of supplier and customer are illustrated diagrammatically in Figure 2.2.

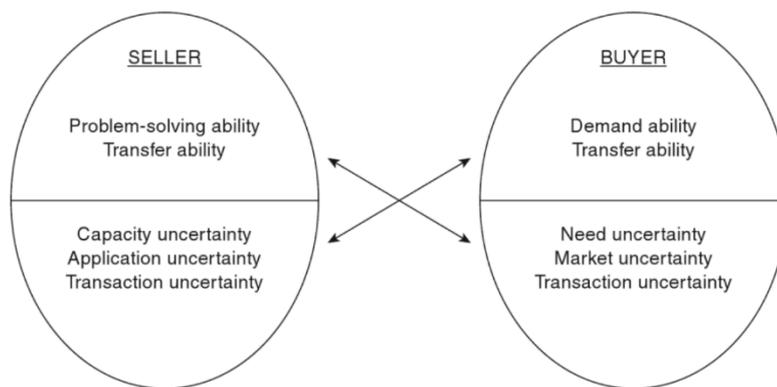


Figure 2.2 The uncertainties and abilities of customer and supplier  
 Source: my own elaboration of Ford et al. (2007)

To conclude the examination of uncertainties and ability that characterized both parties in the interaction process, Ford et al. (2007) have also suggested some consideration about the abilities. Indeed, the authors believe that in well-developed and high-involved relationships, the two parties, in order to ensure that mutually satisfactory transaction take place, may interchange their abilities in the way that

both companies can benefit from this. For example, a retail store may use its demand ability, combined with the knowledge coming from its own customer, for make up the inadequacies of its supplier problem-solving ability by specifying, designing and define how to produce an offering. In the same way, a supplier may use its problem-solving ability in designing complete modules of a customer's final product by combining its component with those of other customer's suppliers, to make up for the lack of customer's demand abilities.

### **II.3.2 Designing offerings: developing the promise**

As said earlier, different factors are involved in the designation and implementation of the offering. In this section the focus will be on the factor involved in the designation of an offering.

Besides the customer uncertain and problems, that are the most obvious bases on which a supplier's offering is developed, the other two factors come into play while designing, developing, evolving and adapting an offering. The second base of suppliers' offering is represented by the suppliers' problem-solving ability, in fact, in this respect, we can consider that customer "buy the seller" and its abilities, rather than simply buy what it sells. The third base is less obvious but equally important and is represented by the customers' demand ability, it is because also supplier may enhance its offering to a given customer or perhaps for others by "buying" some customer's ability.

Both abilities are built on: physical, technological and financial *resources* of each of them, the *position* that they have in their own network, and the ability they have in *managing the relationship* with the counterpart.

Once analyzed on which abilities the design of an offering depends, let define the building box of an offering. From the above-mentioned definition of offering proposed by Ford et al. (2007), the elements that build up an offering are:

- *Products*, that are made by the physical part of the offering. Product considered in isolation may actually be relatively unimportant when compared to other elements.
- *Services*, which nowadays can be considered one of the most important parts of an offering. Their importance is rapidly growing as companies cannot afford to retrain and develop the technologies and resources that are needed to supply their offerings.
- *Delivery*, that refers to where, when, how, and in what form an offering is delivered. This element is important especially when customers have ‘just-in-time’ or ‘zero inventory’ productions that are going on. The delivery of an offering may be not clearly separated by the services. In fact, exists futures of an offering that are part of both elements of an offering.
- *Advice*, it concerns with all the supplier’s activities aimed at increasing the customer’s understanding of its problem. Being an interaction process, it

has a reverse flow of advice that goes e from customer to supplier. This flow of advice is as well important for reducing supplier uncertainties and help the supplier at understanding, firstly, how its offering can be combined with other customer's suppliers' offerings, and secondly, how its offering is integrated into the customer's own offerings. Through advice, customer can also contribute to the supplier's offering with its own technology.

- *Costs and price*, for obtaining and using the offering, customer faces certain costs. Price is likely to be a small portion of the overall costs. Other costs may be the one of working closely with the supplier to develop and adapt the offering, or the cost of integration of the offering in its own operation.

As pointed out by the authors, those factors of an offering cannot be considered in isolation, because they are inter-related and, in some case, substitutable for each other. To put it simply, let us consider a customer that has the problem of transportation, it may choose between different offering for solving its problem. For example, it may opt to buy a truck and hire a driver, or it may opt for a logistic company that provides transportation services. As is clear from this example, physical product, the track, can be a substitute element of a service, logistic service,

in an offering. These kinds of inter-relations are also present among the other elements of the offering.

Defined the elements that build up the offering, let define the process of developing it. The process of developing offerings is an integral part of a broader process through which the two companies develop the technologies on which current and future offering are based (Ford et. al., 2007). Based on the matrix in Figure 2.3 below, we can see whether it is the customer or a supplier who is likely to guide the development process of the offering. As it is clear, it depends on the ability of the parties to recognize new problems and new solutions. For example, in the case customer is able to figure out the problem, but not the solution, and the supplier recognizes neither the problem nor potential solution (Cell 1), in order to develop an offering that solves the customer's problem it is needed a collaborative investigation in which maybe the customer will take the lead of the development. In the opposite situation (Cell 4) the supplier is likely to guide the development. Another type of collaboration is needed in the case both recognize the problem, but neither knows the solution (Cell 5), in this case it is likely that joint development takes place. In cases in which the customer knows both problem and solution, but the supplier knows neither of them or just the solution, the customer has little need uncertain and will be the one who takes the lead of the development (Cell 3 and 6), Instead, in the opposite cases (Cell 7 and 8), the supplier will develop an offering

on customer's specification, but basing it on its technology (Cell 8). The last case (Cell 9) regards situation in which both parties have a good understanding of both problem and solution, in this situation the offering will be based on an innovative solution.

In the examination of the offering development, Ford et al. (2007) focalize its analysis on the single elements of the offering, nevertheless they have underlined how worth is to consider the development of each element considering the inter-

CUSTOMER	DOES NOT KNOW THE PROBLEM	DOES NOT KNOW THE SOLUTION	KNOWS BOTH
SUPPLIER			
DOES NOT KNOW THE PROBLEM	Cell 1 Collaborative Investigation	Cell 2 Collaborative Investigation	Cell 3 Supply to Supplier Specification
DOES NOT KNOW THE SOLUTION	Cell 4 Collaborative Investigation	Cell 5 Collaborative Development	Cell 6 Customer Specified Fulfilment
KNOWS BOTH	Cell 7 Supply to Supplier Specification	Cell 8 Supplier Specified Fulfilment	Cell 9 Collaborative Innovation

Figure 2.3 Developing Offerings.  
Source: Ford et al. (2007).

relationships that exist among them.

While developing the *product* of an offering, different issues need to be considered.

Firstly, the development of a product, ideas and technological knowledge are not

only transferred between supplier and customer, but these firms often cooperate actively with each other in order to develop the product (Laage-Hellman, 2002). Ford et al (2007) have described product development as a ‘rugby scrum’ rather than a ‘relay race’. Secondly, the product development process cannot be seen as a single one-off process to produce the product, but it needs to be considered as a continuous process of refinement, so customer and supplier consistently work jointly on the improvement of this element of the offering.

Concerning the *service* development process, it is needed to take into account both aspect of the product development, simultaneous development and continuous improvement. In addition, two more issues arise in the process of service development. The first is related to the fact that service delivery is individual, so the quality of the fulfilment is likely to depend on the personnel involved. The second issue, that marketer needs to consider while developing an offering, is that there is an increasing tendency for the product element of an offering to be replaced by services. It is due to the fact that companies tend to concentrate on fewer areas of distinctiveness and contract-out other aspects of their businesses.

The development of the *delivery* element can be complex and costly or relatively straightforward. Its level of complexity generally depends on the importance that the product/service delivered has for customers’ operations. Some customers may prefer a closer involvement with the supplier and ask for complex delivery

arrangement, others may prefer to retain the freedom of an arm's length relationship and opt for a more standardized offering.

Another essential element of the offering is the *advice*. Business relationships are based on solving customers problem. Very often suppliers are involved in the recognition of these problems as well as advice potential solutions. This may be the one that confers higher value to the offering in the case the customer is characterized by high need and market uncertainties. Two issue needs to be considered while developing the advice element. Firstly, that traditionally this aspect has been provided by the sale force of the supplier, and when higher technical knowledge is needed, the salesman can involve technical assistance. Recently, company are trying to standardize their advice system by providing web-based information and customer 'hot-line'. Secondly, it is needed to consider that in the offering development process, the advice element is difficult to control, and some time may lead to unexpected adaptation of the offering to customers complex problems.

Being the developing of the offering and interaction process that involve resource and activities of both parties, the offering *price* should not be based only on supplier's costs, but it should take into account the value for the customer in getting it problem solved, and the customer's overall *costs* for designing and implement the offering as point of department for the pricing.

Suppliers may implement different strategies for designing basic offering. They could *focus on a problem* and develop different offerings that aim to solve a defined problem. They could adopt a *range focus*, that is when a supplier designs its offerings basing it on technology, or a range of similar technology, for solving different problems. Finally, a supplier may opt for developing offering adopting a *relationship focus*, that is the case in which it seeks to capitalize on its important customer relationship and build the necessary offering for each of them.

However, as it has been said, the offering does not depend only on the supplier, but it is the output of the business relationship. Thus, once the offering is brought to solve a customer problem, it is likely that the offering needs to be adapted in one or more elements. This *adaptation* may be a routine modification to suit each customer, or it may be a modification for a particular customer that is would not normally do for other customers. In the latter case, by adapting the offering to meet the customer requirements, suppliers may be able to establish new business relationship or *demonstrate commitment* to the development of existing relationships. Further adaptation of the offering's elements may occur as the relationship between customer and supplier develops and the companies invest in it. It is in these cases, that through relationship-specific investments it is possible to develop resource ties and activity links between companies<sup>5</sup>.

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<sup>5</sup> The concept of resource ties and activities links has been faced in the first chapter.



### **III. DEVELOPMENT AND INNOVATION THROUGH RESOURCE INTERACTION**

#### **Introduction**

In the first chapter it has been presented the interaction and network approach that represent the main theoretical point of departure for examine the functioning of the industrial market. According to the researches based on this approach, in the industrial market, or network, technological developments tend to take place in the interaction process between two or more actors of the network. Complex processes, such as innovation and technological development, are possible because of the existence of business relationships that allows companies to access, provide, and exchange resources from, to and with other actors of the network (Håkansson and Shehota, 1995).

The aim of this chapter is to analyze how technological development and innovation take place between organizations.

In doing so, it will first be given a definition of technology trying to draw out the principal elements that compose it. Then, it will be time to present the 4R model, that is a model based on the network approach that tries to explain what happens at the resource layer while two company, have the conditions, to let their resources interact for the purpose of technological development.

Finally, the chapter will end by presenting some typical characteristics of SMEs. It will be discussed the list of advantage that the SMEs have in the “game” or resources interaction, it will be done by referring to the study that has been carried on by Håkansson and Waluszewski (2002) on the IKEA case study. Then, it will be time to present a paper of Hilmersson et al. (2016) where the aim is to understand how SMEs can accelerate their process of innovation.

### **III.1 Presentation of technology**

Technology is a concept that holds different meanings and understandings. Technology, as a term, dates back to the Greek where the combination of ‘techne’ and ‘logos’ meant a discourse on the arts, both fine and applied<sup>6</sup>. Throughout the years, different authors have tried to define technology as a concept. According to with Dosi (1984), technology can be defined as a “*sets of pieces of knowledge, both directly ‘practical’ (related to concrete problems and devices) and ‘theoretical’ (but practically applicable although not necessarily already applied), know-how, methods, procedures, experience of successes and failures and also, of course, physical devices and equipment*”. According to him, technology is a *piece of knowledge* even before being a physical device. In addition, he has emphasized that

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<sup>6</sup> <https://www.britannica.com/technology/history-of-technology>

technology is also a combination of past successes and failures, thus the *experience*, with the present knowledge and achievements.

Mackenzie & Wajcman (1985)<sup>7</sup> have defined technology by dividing it into three layers: physical objects and artefacts, activities and processes, and know-how of both usage and developments. The authors add something more to the concept of technology of Dosi. They have pointed out that know-how should be considered from both point of views, *development and usage*, and from the development point of view, the know-how of the usage is considered as part of the technology. This way of defining technology also recognizes the role of *external knowledge*. In addition, Mackenzie & Wajcman have pointed out that processes and activities, that are part of the technology, are performed thanks to the *know-how* owned.

Other authors give more attention to the abilities that make possible the use of technology. For example, Ford and Saren (1996) define the three abilities that make possible the development, the manufacturing and the commercialization of technologies. They divide technologies into:

- Product technologies, that are the company's abilities to develop a technology.
- Process technologies, that reflect the company's abilities of manufacturing.

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<sup>7</sup> MacKenzie, Donald and Wajcman, Judy, eds. (1985) *The social shaping of technology: how the refrigerator got its hum*. Open University Press, Milton Keynes, UK.

- Marketing technologies, which are the abilities of a company to relate its product to the requirement of other companies and their technologies.

Ford and Saren have added a new element to the context of technology definition, in fact, defining marketing technologies, the authors underline the *importance of relationships with other actors of the market*.

Further definition of technology, that refers to the role of relationship with other actors of the market, is given by Ford et al. (2011) that define the technology as “the ability based on systematized knowledge that can be used for a commercial purpose”. They have underlined how single technology has no value inasmuch technology cannot be used in isolation.

The authors have identified three levels of connection between technology and business relationship. Firstly, they have pointed out that companies establish relationships in order to gain access to the technological resources of others and to exploit their own expensively developed technologies. Thus, technologies have no value without relationships, and relationships have no value without technologies. Secondly, technology is developed in the relationships between company and in companies themselves. Finally, the technologies developed within a relationship can, on the one hand, be used in other relationships, and on the other hand, be transmitted, modified and combined with other technologies for solving different

problems, thus affecting many companies and landscape in different parts of the business network.

Ford et al. (2011) with their view of technology emphasize how “technology must be combined with others, both old and new and adapted and refined, to solve particular problems”. Thus, in their view, each technology is “embedded” in the network of business relationships through which it is used.

What came to light in these definitions is that, technologies are seen as several types of resources that are connected and combined through relationships. These resources can be both physical and knowledge-based, and their development can take place between companies as well as within.

In order to give further insight into technology, and thereby technological development, it will be necessary to analyze what happens at the level of resources by discussing the 4R model.

### **III.1 Interaction of resources for technological developments**

In the first chapter, it has been discussed how interactions play a key role in business markets. From the technological development point of view, in order to grasp the dynamics that regulate the resource development and the resource

utilization, it is not enough to consider the general interplay between actors, but it is fundamental to focus on the interplay that involves resources.

From the Industrial Marketing and Purchasing view of the industrial markets, technological development and innovations are generally investigated by focusing on business network resources' layer (see Figure 1.4). In other words, according to this school of thought, it is needed to apply a resource interaction perspective in order to analyze the dynamics that regulate the development and use of technologies in the industrial networks (Håkansson and Waluszewski, 2002).

In the examination of the complex interaction processes that involve resources, Håkansson and Waluszewski (2002) have identified underlying assumptions for the comprehension of these. Firstly, they have pointed out that *through resources interaction certain features of these resources are developed and embedded into each other*. They have suggested that for the understanding of the resource interaction, the comprehension of how these features are affected seems to be a key issue. Secondly, the authors have pinpointed the *four categories of resources* and defined these as essential resources that are created and formed within the network through interaction. These categories are: relationships, business units, products and facility.

Another important aspect concerning the interaction of resources, is how resources interface to each other. Thus, it is not only the interaction itself that activate

innovation through the creation of new resources, but it is also the way in which these resources are interfaced. Resource interface can be seen as the point of contact and interconnection among two or more resources (Håkansson and Waluszewski, 2002; Baraldi, 2003). So, technological change can occur also by combining resources in different ways. Van de Ven et al. (1999) has pointed out how this recombination of resources and the modification of their interfaces generate innovation at both levels, the development one and the usage one.

In the following, it will be presented the 4R model that lists the four types of resources and explains how the interaction has a specific effect on the features of the four categories of resources. This model is considered by the majority of IMP's school of thought's scholars, as the point of departure for the understanding the innovation processes in industrial networks.

### **III.1.1 Four type of resources developed in interaction**

The interaction process that involves resources can be seen as a process that aims to create both stability and change in the interface between resources. In other words, it includes complex problem solving of how different resources can be combined and interfaced in order to increase the utilization, by developing,

changing and experimenting, within a certain activity structure. Thus, during the interaction process the features of the resources are influenced and shaped.

However, it is important to underline that neither all the resources owned by the interactive entity get in contact, nor all the resources that get in contact generate positive outcome (Håkansson and Waluszewski, 2002).

In this section it will be analyzed how the interactions have specific effects on the features of the four categories of resources. Firstly, it will be presented the cases of physical/technical resources, products and facilities, and then the case of social/organizational resources, business units and relationships.

#### **The effect of interaction on products:**

Products, in the form of both goods and service, are considered resources. In contrast with the traditional view of economic exchange, the network approach suggests that rather seldom buyer and seller consider products as given. Indeed, as it has been seen in the process of designing offerings, the features of products are developed interactively between buyer and seller, thus adapting them to both business units and relationships, in fact, products are adapted to both the buyer production process and the buyer's customers production. Products, as resources, reveal their value through usage or sale, thus each product is considered as part of two systems: selling system and using system. In each of them, the products interact

with other products modifying their features and the features of the products with which they interact.

As a consequence, Håkansson and Waluszewski have pointed out that interaction with new companies may bring the products into a new setting that change their specific features.

**The effect of interaction on facilities:**

Facilities are required in some way in order to develop and manufacture products. Buying and selling firms struggle to reduce costs or increase efficiency by connecting facilities to each other. The interaction between producing and using companies aims to solve these kinds of problems by making people of these company interact for developing news facilities or combining them in new ways. In this respect, they become, as products, part of both business units and relationships. The effect of interaction on facilities cannot be considered only from a physical point of view, such as how different parts of a production facility is changed in order to fit into the production facilities of the counterpart, but they have to be considered also from a knowledge perspective, such as how to use a certain set of inputs to perform a particular set of activities.

In conclusion, facilities sometimes have certain latent features that can be activated only if they are put into interaction with each other. Usually, technical development

can be activated through the search for and utilization of hidden features of facilities.

**The effect of interaction on business units:**

Business units are composed of immaterial resources as well as facilities and products. Through their knowledge, business units use specific facilities for producing certain products. One of their skills is the ability to cooperate with other business units. Interacting with each other, business units develop certain features in terms of knowledge about the counterpart and the ability to work with other business units. Some of these features can become embedded into the features of the counterpart. This way of seeing business units underline that they are characterized also by social features which are developed in these co-operations. Not less important are the abilities of the business units to co-operate with others. This ability includes earlier experience as well as technical and commercial knowledge. The ability to co-operate that characterize business units, affects what can be reached in technical terms with facilities and products, so it represents a crucial ingredient for the development.

**The effect of interaction on relationships:**

The exchange of product and the connection of facility among business units are possible thanks to relationships. Thus, relationships are resources that allow companies to interface with each other. In addition to linking business units,

relationships connect situation over time, giving to both parties involved opportunities as well as restrictions. The features of relationship can be used for political purpose, for supporting or going against someone, and for technical purpose, connecting resources. Connecting relationships to each other appear as important as connecting business units for technological development.

The above discussion, that has been presented by Håkansson and Waluszewski (2002), tries to figure out the way in which individual resources are related and used due to the interaction process between organizations in a business network. To sum up, the authors have identified two common traits held by all four type of resources: the first concerns the *high dependency that exists among them*, so it is important to consider all of them while examining the dynamics of technological development; the second regards the fact that *all of them are preceded by individuals*, thus are individuals who interpret and develop these resources. Without individuals, resources would have no economic value.

### **III.2 What makes SMEs different in this way of interpreting technological development**

Beyond the mechanism of resource interaction and combination that foster the innovation thrust of industrial networks, it is also needed to make considerations on

the ability of the single actors of the network to activate the innovation through resource interaction.

Traditionally, the literature in the field of industrial innovation has always seen small-size companies as not decisive for the purpose of developing new technology or new knowledge. The main argument that supports this vision has been formulated by Baumol (1961) who has argued that big companies can take advantage of the same opportunities of the small company because large capital can always be divided up into smaller parts while it is not true for small companies that cannot take advantage of opportunities which require a large amount of capital. Being big has been regarded as an advantage in itself also by other authors, such as Porter (1981) who believed that big companies can take advantage of economy of scale also in the function of research and development. These views of “big is beautiful” focused mainly on the centrality of physical resources for the development.

Nevertheless, other authors who recognized the importance of the knowledge as a central resource for the development, have affirmed that to produce new knowledge being big is a necessary condition (see Edgerton, 1996).

Even though the literature has traditionally focalized the attention on the role of the big players for catch the mechanism of knowledge creation and innovation, recently the discussion has been enriched by some authors who have argued that a key role

can be played also by small companies (Håkansson and Waluszewski, 2002; Lambert and Schaeffer, 2010; Ndou et al., 2011, Colombo et al., 2012)

The new strand of thought that sees the role of the SMEs as important in the dynamics of innovations, has been also pushed by the observation of qualitative and quantitative data. As Henry Chesbrough has pointed out in a speech at the Haas School of Business, in the united states companies of less than 1000 employees have increased their incidence on the total spending in R&D by about 520% jumping from 4,4% of the total amount of money spent in US in R&D in 1981 to the 23% of the 2011 [Figure 3.1].

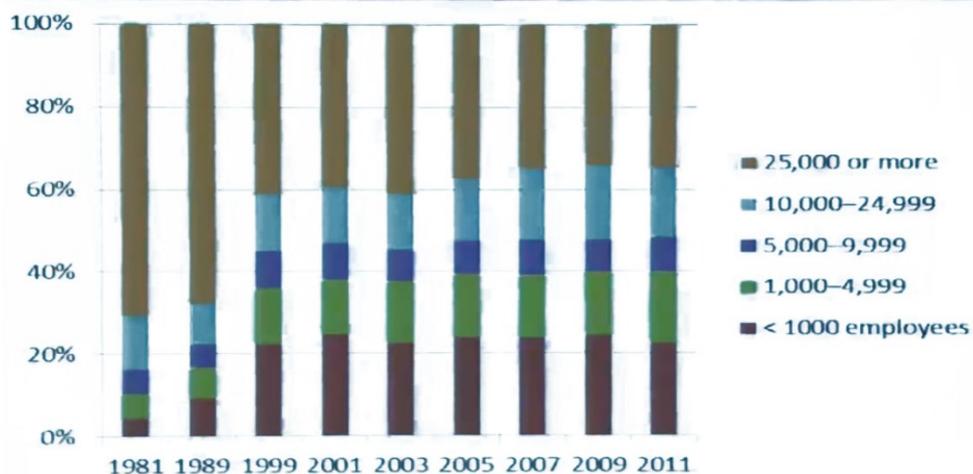


Figure 3.1 Where R&D is performed in the U.S.  
 Source: imagine from YouTube, data from National Science Foundation.  
 Image: <https://www.youtube.com/watch?v=oHVz61O3YYg>  
 Data: <https://www.nsf.gov/statistics/data-tools.cfm>

Quantitative data confirms this trend also in Italy, where companies of less than 50 employees have almost triplicate their contribution to the total spending in R&D. Their investments have increased from € 395,6 million of 2002 to € 2380 million of 2017, reaching 16% of the total expenditure of the Italian businesses' R&D [Figure 3.2].

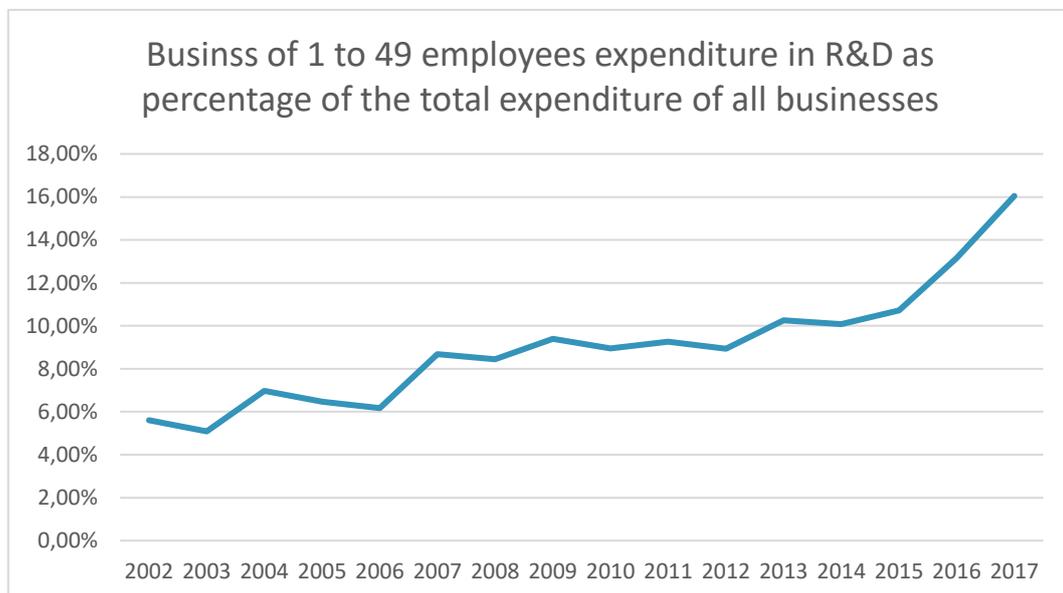


Figure 3.2 Expenditure in R&D of company of less than 50 employees as percentage of the total expenditure in R&D in Italy  
 Source.: my own elaboration based on data from EUROSTAT.

Beyond the increasing of investment by SMEs in R&D that underline changes in the role of SMEs, there are also cases in which SMEs have solved problems of a big company by discovering new applications of technologies. It is the case reported by Håkansson and Waluszewski (2002) in the book 'Managing technological development', where the authors describe how the resources of a small company,

the Sweden's smallest producer of bleached market pulp Aspa, was indispensable for the innovation of the paper industry. In fact, thanks to its cooperation with other players of the markets it was possible to develop the innovative totally chlorine-free (TCF) bleaching method that was what allowed to IKEA to address the 'green demand' coming from its market.

What it comes to light from the above discussion, is that small businesses seem to be relevant in the process of technological developments and innovation.

In the next section it will be presented, firstly, some characteristics of small businesses that may be considered as advantages in the "game" of resources interaction for the purpose of innovation. Secondly, it will be analyzed how small businesses can gain a competitive advantage in the setting in which the constraints of being small fade.

### **III.3.1 The advantages of being small**

Håkansson and Waluszewski (2002) in analyzing the case of IKEA and the technological development of a new eco-friendly type of paper for printing its catalogues, have noted that in the big network of actor involved in this development process, it was the contribution of the resources a small company, Aspa, that allowed the development of this new type of process for producing paper free of chlorine.

In trying to figure out the motivations that made possible for this small company to solve problems that other big paper producers weren't able to solve, the authors have pointed out some characteristics of a small company that may make them suitable for the development of new knowledge.

Of course, the authors do not question the importance of being large, but they identify some advantages that in particular situation may benefit small businesses in the innovation.

Turing on the advantages of being small, Håkansson and Waluszewski have grouped these in three categories of reasons. It is important to underline that those advantages can be valid only in contexts in which different actors are bound together.

The first category or reasons regards to being small in terms of resources. With a reduced amount of resources, companies *take for granted the fact that they need complementary resources* in order to activate the value of their small amount of resources. Choosing the right partner may be difficult, and the authors suggest that small companies to choose carefully their partners basing their choice on the complementary resources owned by them.

Another class of reasons related to the smallness of resources is related to the fact that, in the interaction process *adapting small amount of resources is easier and cheaper*. Thus, it is easier to integrate new knowledge when resources are limited.

Connected to the simplicity of relating new knowledge to small resources, there is the second category of reasons concerned with the fact that small business units are characterized by a small number of activities. One of the positive effects of having a small activity structure is that it presents *advantages in the transference of new knowledge into commercial solutions*. In fact, perform large-scale tests in small activity structure has advantages in terms of costs, furthermore, it is easy to control the total production activities once the experiments are concluded. Activities smallness is not only advantageous in terms of ease of development handle, but it also presents a *higher level of flexibility and adaptability*. Indeed, when new activities are established in small companies, it is easier for others to fit them into the total existing structure. In other words, suppliers and customers of the small company can find a way to integrate these new activities without changing too much in their own activities.

The last category of reasons concerns the size of the actors themselves. The first advantage is that in small companies, it can be easier *to handle a change from a managerial point of view*, being the structure of the company simple. The second, even more important according to the authors, is that embedding smaller units in larger ones create, in the case they arise, frictions that become less onerous for all the parties involved.

Håkansson and Waluszewski concluded their discussion on the advantages of being small by pointing out that these categories of reasons seem to outline situations in which being small in a network can create some important advantages. The smallness in itself can, in certain situations, increase the possibilities of interaction and adaptation to others.

### **III.3.2 Networking and crossing relationships to accelerate the innovation process**

In conclusion, before to go ahead with the case study, it will be discussed some issue concerning small and medium enterprises and the innovation. The first them that it will be discussed regards a study of Mikael Hilmersson and Firouze Pourmand Hilmersson that has been presented at the IMP-conference in Cape Town in 2016<sup>8</sup>. They build a theoretical model built on 203 Sweden's small company in which model aims to explain the rate of innovation.

The first variable they find for explaining the innovation's rate concerns the development of innovation capabilities. They have empirically demonstrated that the elapsed time between the inception and the first innovation by the firm seems to be negatively related to the innovation rate of small businesses. According to

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<sup>8</sup> The article can be downloaded for free from the IMP website:  
<https://www.impgroup.org/uploads/papers/9098.pdf>

their study, shorter the window of time between the inception of the firm and their first innovation, greater the capabilities of the firm in have a high rate of innovation in the later development of the firms. They supported this thesis by underlining that by starting the innovation process at young age, SMEs can foster an innovative and open-minded organizational culture where new ideas and product constantly are developed. In addition, a high rate of innovations also means that there is a likeliness that the firm becomes less reactive and can instead proactively be an actor that changes the market environment. Thus, by developing innovative capabilities at an early age, the firm is likely to drive market changes instead of being challenged by them.

The second finding of their study is related to the fact that companies which lack innovative resources or capabilities, can compensate this shortcoming by actively networking in order to moderate the negative effect of the above-mentioned relation. The authors of the study have demonstrated that active networking by the firm, moderate the negative relationship between elapsed time between firm inception and rate of innovation. Furthermore, networking, can be seen as a strategic choice of a company that, instead of developing all resources and capabilities internally, seek to access resources or capabilities of other actors in the network. However, in order to tap resources and capabilities from the network, companies need to develop an 'insidership' position in the network that possess the needed resources and capabilities (Johanson and Vahlne, 2009).

The second issue concerned with small business and innovation that will be presented, regards the importance of developing relationship with several actors, some of them specialized in different core activities, and others belonging to different industries or sectors for the purpose of being innovative. The study conducted by three researchers of the Catholic University of Milan<sup>9</sup>, is a single case study on an Italian SMEs operating in the automotive industry. The study aimed to investigate the business models that could be adopted by a firm in order to develop innovations. The main finding of the study is that, SMEs can play a key role in innovation network as they are able to facilitate and combine horizontal and vertical relationships with heterogeneous actors. In other words, what is important for SMEs that want develop innovation, is to focalize on relationships as key elements of their business model.

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<sup>9</sup> Chiara Cantù, Loretta Battaglia, Elena Cedrola. The paper can be downloaded for free from the IMP website: <https://www.impgroup.org/uploads/papers/7953.pdf>

## **IV. THE CASE STUDY: PROSILAS S.r.l.**

### **IV.1 Methodological notes**

The methodology chosen for the research was the “single case study” (Yin, 1994; Eisenhardt, 1989; Stake, 1995) because of the explorative nature of the study.

The reason beyond the choice of Prosilas, as the subject of the study, is firstly related to the openness towards this kind of researches showed by the company, indeed, it has already been the subject of other studies in various fields of research.

Moreover, the type of the market in which the company operates, the Business to Business, and the high technological content of its core business, the additive manufacturing, makes this company, respectively, an adapt and an interesting subject to study.

The primary method used for the collection of the data has been the semi-structured interview. The interviewees are part of the top management of the company, respectively, the CEO and the CTO. The focus of the semi-structured interviews has been the understanding of the main features which characterize the supplier-customer relationship between the subject of the study and its supplier of machines, which is the actor with whom Prosilas maintains a close working relationship since its foundation. Further information has been collected with respect to other

meaningful relationship of the company, such as the relationship with its customers, other services centers, and some other key partners.

Additional information has been taken from other sources, such as the website of the company, the company's documents and the previous studies on the company.

Regarding the information of the provider of machines, it has been collected both from the company website and the annual report of the company available on the German department of Justice website.

## **IV.2 Prosilas: an overview of the company**

Prosilas is a small family business that was established in 2003 by the aerospace engineer Giulio Menco, his cousin and a production expert in plastic melting. Since the foundation, the business has been developing and nowadays Prosilas offers services that have as core technology the *Additive Manufacturing* applied for rapid prototyping and small-series. Using the categorization suggested by Roger<sup>10</sup>, from a commercial point of view, the

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<sup>10</sup> ROGERS, H., BARICZ, N., PAWAR, K.S.; *3D printing service: classification, supply chain implication and research agenda*; in "International Journal of Physical Distribution & Logistics Management"; Vol. 46(10); 2016.

company's offering can be defined as *facilitative service* because Prosilas has neither internal designers nor 3D models database<sup>11</sup>.

The solutions it provides are based on two kinds of techniques:

- SLS (Selective Laser Sintering) technique that uses a laser as the power source to sinter powdered material in order to create solid structure.
- SLA (Stereolithography) technique that is based on the solidification of a liquid photosensitive resin using a laser ray.

The materials used vary according to the technology used. For the SLS technique, Prosilas uses materials based on Polyamide 12, a plastic-based material characterized by mechanical strength and good elasticity; concerning the SLA, Prosilas uses mainly a biocompatible transparent resin.

Besides the activities based on the printing technology, Prosilas also provides finishing service, such as painting and metallization, reverse engineering and 3D scanning<sup>12</sup>.

Throughout its 16 years in *Business to Business* markets, the company has been working with various players from different industries such as

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<sup>11</sup> Rossi M., *Barriers to the commercialization of innovative services: Case study Prosilas SRL*, Università Politecnica delle Marche, Thesis, 2018/2019

<sup>12</sup> The information about the service were taken by the company's website, [www.prosilas.com](http://www.prosilas.com)

automotive, lighting, fashion, furniture and design, and nowadays Prosilas is also carrying on researches in the field of bioprinting for entering this sector. In terms of numbers, in the fiscal year 2018, Prosilas had 20 employees, 10 industrial printers, and achieved a turnover of € 2.8 million<sup>13</sup>.

Currently the turnover is almost equally distributed between the rapid prototyping and mini-series. The strategic objective of the company is to further increase the activity of mini-series (nowadays it represents about 50% of the turnover) in order to become a “*real additive manufacturing center*” and not just a provider of prototyping services. According to the founder, becoming an additive manufacturing center will represent an “*epochal evolution comparable to the discovery of the steam engine*” for the company.

#### **IV.2.1 History of the company**

The history of Prosilas began when Giulio Menco started to get interested in 3D printing, which at the time did not enjoy the fame it has today and was only known by few experts, especially with respect to Italy. In 2003 Giulio Menco and the other two associates decided to invest in their first 3D printer

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<sup>13</sup> Information were taken from the internet, [www.nextequity.it/progetti/prosilas.html](http://www.nextequity.it/progetti/prosilas.html)

(EOS P 380) sanctioning the opening of Prosilas S.r.l. based in Civitanova Marche.

To give an idea about how much this sector was young at that time, the annual unit sale of professional-grade industrial systems<sup>14</sup> in 2003 was about 1500 worldwide<sup>15</sup>, while the annual unit sale in 2018 was 19285<sup>16</sup>, the trend is exponential [Figure 4.1].

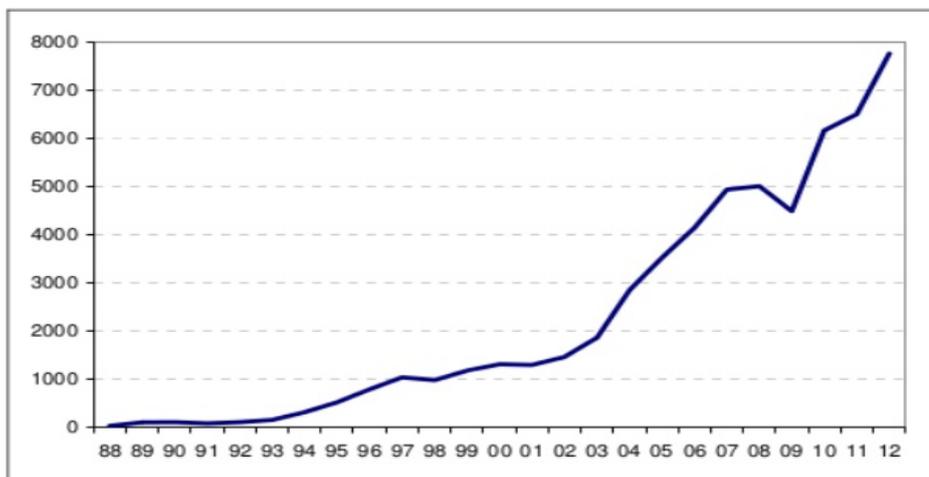


Figure 4.1 - Annual Unite Sale of Industrial Printers;  
Source: Wohlers Associates, Inc.

At the beginning, the idea of the leading investor, the cousin of Giulio Menco, was to produce scale models for architects and engineers. Despite this, Prosilas never developed this idea as a line of business, maybe because of the

<sup>14</sup> The number of “personal” systems are excluded, data takes into account only the 3D printers which cost more than \$5,000.

<sup>15</sup> T. Wohlers, Wohlers Report 2013, Wholers Associates, 2013.

<sup>16</sup> T. Wohlers, Wohlers Report 2019, Wholers Associates, 2019.

little knowledge about this technology at that time and because of the imminent construction crisis which turned this idea in a risky one.

Although this, Giulio Menco promptly understood the potentiality of this technology, and he urged to formulate a value proposition for satisfying the needs of big companies.

The first piece Prosilas printed was for Teuco, a company specialized in the ceramic industry. Then Giulio Menco got in touch both with iGuzzini, a company of the same group of Teuco and specialized in lighting, and with Clementoni, a toy manufacturer located in the same industrial park of iGuzzini<sup>17</sup>.

Prosilas understood that the large-scale industry was the best client with which make business.

Thanks to the commercial triangulation with those initially unexpected partners, Prosilas was able to grow fast. This growth has been also helped by EOS, the supplier of machines, which ensured to the small business' customers a top quality printed-products, thanks to the technology supplied,

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<sup>17</sup> The above-mentioned companies, except for Teuco which went out of the business in 2017, are still customers of Prosilas and are part of the so-called "*historical list of customers*".

combined with a low lead time, thanks to the good assistance offered by the provider of machines.

In 2007, Prosilas faced a corporate restructuring where the two associates were paid off and Giulio Menco took over the company. In 2008 Giulio's daughter, Vanna Menco, entered the company as CEO and Giulio Menco became the CTO. Since then, Prosilas gradually invested in nine more 3D printers, strengthening its position in the market of rapid prototyping. Nowadays, thanks to their strong commitment to keeping up with the most advanced technology, Prosilas can be considered a specialist in the field of polymer laser sintering SLS.

The machinery park is one of the Prosilas' elements of distinction. Among the ten 3D printers, there are three EOS P 770 which have the largest building volume available on the SLS market (600x370x540mm), they have been "*a turning point for the company*" since Prosilas was the first Italian company which invested in such unique 3D printers in the August 2017, and according to Giulio Menco, nowadays Prosilas is the only Italian company which has this kind of machine at its disposal.

## **IV.2.2 Structure of the company, and the key people**

Prosilas is a SME (Small and Medium Enterprise) characterized by a simple organizational structure. At the top of the organigram there is the sole CEO Vanna Menco, that entered the company in 2008. She is in charge of the supervision of the administrative activities, the training and recruitment of the staff, the management of collaborations with research institutes and everything that is concerned with the development and organization of the company. In 2016 she established the commercial office and started to manage the first research project in the biomedical field.

On another level of the company's structure, there is Giulio Menco, founder and technical manager of Prosilas. Besides the important role of technical manager, he is also the production manager. In addition, he is responsible for the research and development of innovative processes and materials.

As previously said, the company has 20 employees. The majority of them (15 technicians) are employed both in the laboratory and in the production area; the commercial office is composed of 3 employees, and two people work in the administration<sup>18</sup>. The chart below summarizes the company's structure.

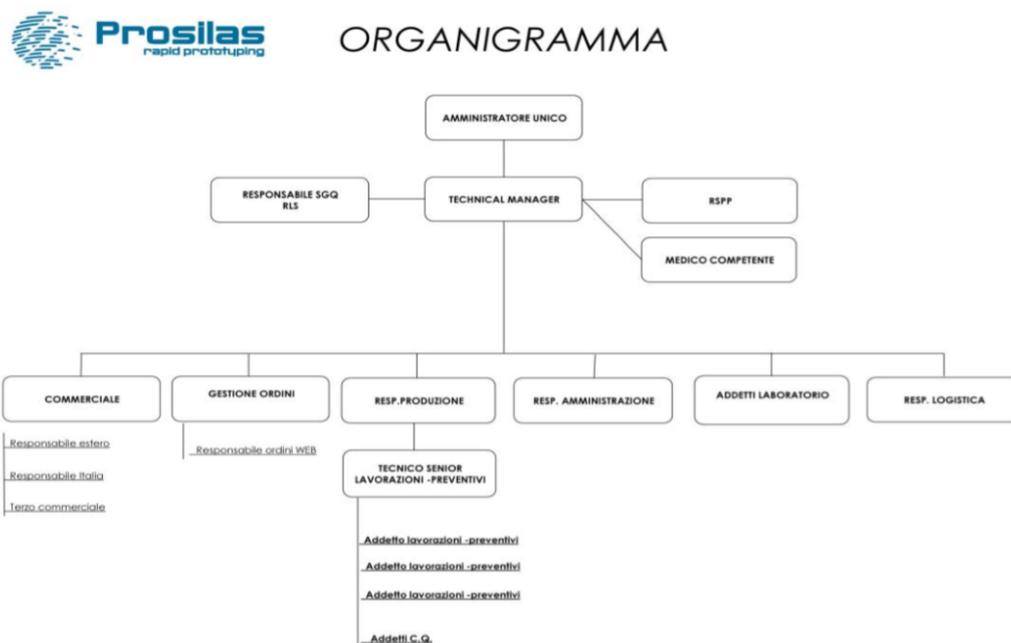


Figure 4.2 - Prosilas' Organizational Chart.

Source: Document provided by the company and revisited to obscure the name of employees.

As the chart illustrates, the production area is the most articulated. As confirmed by the CEO, this is because the production is *the heart* of the business, therefore it has been the focus of the development since the beginning. The other departments are fundamentally new business areas that

<sup>18</sup> Rossi M., *Barriers to the commercialization of innovative services: Case study Prosilas SRL*, Università Politecnica delle Marche, Thesis, 2018/2019.

have been developed for a couple of years from now. For example, the commercial and marketing office was established about one year ago.

Due to the increasing degree of complexity of the business structure, Prosilas has been using a more structured consultancy service that analyses the structure of the company. From the interview it also comes to light that in the last years the company has been using those kinds of consultancies to enhance managerial control.

### **IV.3 The relationship with EOS and its evolution**

EOS has been the supplier of the first Prosilas' 3D printer and it is still the partner with which Prosilas relies on for its SLS machinery park and the Polyamide 12, which is the base of most of the used materials. During those 16 years of partnership, the scope of the relationship has evolved shifting from simple exchange episodes, in which the aim was to keep the machines working, to more articulated exchange episodes that have broader scopes.

In this part it will be described the business relationship between Prosilas and EOS. Firstly, it will be given an overview of the supplier of the 3D printers, then it will be time to go deeper and figure out why Prosilas selected and confirmed EOS as supplier of SLS machines and materials. Then, it will be given the description of

the business relationship's atmosphere. To conclude, this part will end up by describing a close working cooperation episode for the enhancement of a machine.

### **IV.3.1 EOS GmbH.**

EOS - Electro Optical Systems – was founded in 1989 by Hans Langer who established the company in Munich (Germany). The EOS GROUP includes a wide range of companies all over the world. These focus on the development, production and sale of customer-specific and application-specific materials, as well as on industry-specific and application-specific AM (Additive Manufacturing) solutions and therefore on the development of customer-specific "AM-based digital factories". EOS customers come from a wide range of industries, including aerospace, medical, automotive, tools, lifestyle and prototyping.

The company was born exploiting the opportunity offered by BMW which was looking for a 3D printer based on the stereolithography (SLA) for industrial use that was not available on the American market. The vision of Mr. Langer combined with the venture capital offered by BMW made possible for EOS, in 1991, to develop the first European stereolithography machine with the aim of satisfying the BMW's needs, the STEREOS 400. The following year EOS came up with the second machine, STEREOS 600, which allows EOS to become Europe's market leader for high-end rapid prototyping technology. This success attracted the attention of

international players of this market, such as one of the main competitors, 3D System, which sued EOS for patent infringement. Due to this situation, EOS shifted its focus on the Selective Laser Sintering (SLS) technique, which allows to print plastic or aluminide parts, and in 1994 it launched on the market the first European system based on that technology. In addition, in 1994, EOS concluded a cooperation agreement with Electrolux RD for the development of Direct Metal Laser Sintering technology (DMLS) and in the same year it launched the EOSINT M160, a 3D printer of metallic materials. Nowadays EOS offers six different Selective Laser Sintering systems, among which the P 770 is the one with the largest building volume available on the market, and six different Direct Metal Laser Sintering Systems.

Besides the manufacturing of 3D systems, EOS offers a wide range of materials, which range from the plastic-based to the metal-based powder, and different kinds of software suitable for the preparation work of the CAD files and the quality control of the printing processes. Furthermore, EOS provides a variety of services for assisting its customers from a technical, managerial and financial point of view and for training them for better use of the machines, materials and software<sup>19</sup>.

The story of the company is full of successful cooperation with several major industry players, from a range of specialist areas, who have been helping EOS to

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<sup>19</sup> Information was taken from the EOS website: <https://www.eos.info/en>

optimize its products. Among them the most victorious are<sup>20</sup>: the collaboration with 3D-Micromax AG to develop a technology for Micro Laser Sintering; the partnership with Morris Technologies and GE with the aim of improving the technology and application of direct metal laser sintering; the working relationship with Materialise which helped EOS in improving the positioning of components in its laser sinter systems; and, the strategic partnership with Cookson Precious Metals (CPM) that helped EOS in reaching a further milestone in the development of Additive Manufacturing (AM) materials. Regarding the capability of EOS to capitalize its relationship in terms of product improvement, as it will be discussed later, EOS took advantage of the Prosilas' relationship for the resolution of a machinery problem related to the temperature.

The company has been steadily growing since it was founded, reaching in the fiscal year 2017/18 a turnover of € 345 million with roughly 1300 employees throughout the world<sup>21</sup>.

Due to this fast growth, EOS faced a company reorganization a couple of years ago, which turned in a change of part of the management, of any levels, and a redistribution of tasks and responsibilities. Looking at the corporate management<sup>22</sup> advertised on the EOS website, two out of three members are in charge of their

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<sup>20</sup> <https://30years.eos.info/en>

<sup>21</sup> EOS Holding Aktiengesellschaft (2019). EOS Holding Aktiengesellschaft consolidated financial statements for the financial year from 01.10.2017 to 30.09.2018. München. DE.

<sup>22</sup> [https://www.eos.info/about\\_eos/corporate\\_management](https://www.eos.info/about_eos/corporate_management)

position for less than three years<sup>23</sup>. Regarding the Italian branch, the Regional Manager has been in charge for three years<sup>24</sup>.

According to the annual report 2017/18, EOS owns 17 branches scattered all around the world, two of them are located in the USA, four in Asia, one in South Korea and the rest in Europe [Figure 4.3]. In addition, the network of EOS is completed by 38 distributors located worldwide, two of which in Italy. The company has begun its expansion in the world starting from Europe in 1992, with the opening of its first branch in French, and then in 1997 when it expanded with the establishment of an Italian production site in Milan.



Figure 4.3 - EOS' European branches. Source: the company website.

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<sup>23</sup> The CEO Mariel Langer is in charge since October 2019, while Eric Paffrat, chief financial officer, joined the company 3 years ago. This information has been taken from their LinkedIn profiles.

<sup>24</sup> This information has been taken from his LinkedIn profile.

In order to keep up with the increasingly demanding market and with the additive manufacturing technology, which is getting more complex and moves faster and faster, EOS carries out researches both within the company and with strategic partners of the academic and industrial sectors.

The declared objective of the company is to implement its additive manufacturing processes as a consolidated mass production process, and to achieve this target EOS invested 17.7% of the revenue in research and development activities in the fiscal year 2017/2018.

### **IV.3.2 The selection of EOS as a machines' supplier**

The production function is the fulcrum around which Prosilas has been built and being the 3D printers the beating heart of the production function, when it was time to decide which first 3D printer to buy, the founders faced an articulated decision and opted for EOS P 380.

As the CEO explained during the interview, Giulio Menco decided to start a business relationship with EOS rather than the other market leader of the time, 3D Systems, mainly for three reasons.

Firstly, because differently from EOS, 3D Systems does also service, thus they are also directly involved in the business of rapid prototyping and, according with what

said by the CEO, this situation could have led to “*unfair competition*”. On the contrary EOS not only is not involved in this kind of business, but also they work through the service: it means that EOS often delegates services, such as benchmarking and proofing activities, to its customers, such as Prosilas, because it is not its primary activities.

Secondly, as explained by the CEO, from the technological point of view, EOS seemed to be the most fitting offering in terms of printing volume, materials and technical support. Those characteristics earned EOS a premium price for its machines that Prosilas was willing to pay. Indeed, as said by Vanna Menco, “*EOS’s machines are more expensive respect to the 3D Systems’ machines, but we preferred anyway to go for them*”.

Moreover, Giulio Menco pointed out also that he preferred the printing orientation of EOS systems in respect to the one of 3D Systems. The former uses a vertical building process, and according to what the technical manager believes this is better from a constructive-technical point of view.

The third reason why EOS has been chosen was about technical assistance. Being 3D Systems an American company, it offered European assistance that was supposed to be for all the European market segment, therefore a downtime could have been meant a long time before the intervention of fixing. Instead, being EOS a European company, with the headquarter located in Munich, it was supposed to have a more structured assistance throughout Europe which would have ensured

prompt responses, and this counted enormously for Prosilas since it had only one machine at that time.

Through the years, EOS has been confirmed as the supplier of SLS technology, moreover currently it is the single supplier for that technology.

### **IV.3.3 The intensification of the relationship between Prosilas and EOS**

The first couple of years were preparatory for the establishment of the long-term relationship between Prosilas and EOS. As the CEO said in the interview “*the relationship was built in the firsts years thanks to the good exchange with EOS’ technical assistance and our explorative approach to the relationship which turned it in an open and virtuous dialog, especially with the technical service*”. In the years, Vanna and Giulio Menco, wanted to confirm and keep the relationship with EOS, even in the face of more advantageous commercial offers. They realized that keeping EOS as a 3D printer provider would have been a facilitator, because the relationship continuity would have given some standardization to the Prosilas 3D printing systems. Moreover, it would have allowed them to bargain over materials and technical assistance which are the most critical aspects, for a company such as Prosilas, with respect to the machine cost which is a lump sum. After the first couple

of years in which the two companies got to know one another, their relationship has been evolving, going beyond the regular supply of machines, materials and technical assistance.

During the years, the relationship with EOS has been strengthening in many respects. The main axes in which the relationship has been expanded regard: a closer technological consultancy, an elder degree of involvement of Prosilas in some test of EOS and a closer collaboration from a commercial point of view.

With respect to the closer technological consultancy, nowadays between EOS and Prosilas there are *constant technological exchanges* that aim to share as know-how as possible between the partners, regarding EOS systems and materials. On the one hand, when either new printers or new materials are tested or bought by Prosilas, EOS sends its specialists, in order to stand next to the Prosilas' technicians, for teaching them the correct use of the EOS products. On the other hand, when something goes wrong in the production process, Prosilas get in contact with the EOS' specialists for a double scope: firstly, solving the problem and carry on with the production, and secondly to make EOS aware of problems that arise with the intensive use of its systems.

Further development of the relationship takes the form of "*first test-taker*" or "first Italian client", in other words sometimes happens that EOS drugs Prosilas in tests regarding new products. It happened once when EOS sold the first P 770 in the

Italian market to Prosilas, and it happens nowadays also with other products, such as new materials. The advantages of those dynamics are for both.

On the EOS side there is a divalent benefit. Firstly, having a partner which is willing to experiment those products allows the producer to get feedback on their performances; secondly, giving those new products to the most successful partners allows EOS to use these partners as business card for potential customers.

From Prosilas point of view it is valuable to be part of the tests because, for example, in the case where the testing lead to the discovery of materials with higher performances than the one in use, this advantage can be immediately transferred to its customers.

Recently the logic of “first test-taker” is getting bidirectional, or rather, it is no longer just EOS that asks Prosilas to test new products, but also Prosilas that asks EOS to be the first buyer or tester of some products.

To conclude, another critical aspect of the relationship’s intensification regards the recent evolution, which takes the form of a *media collaboration*. This collaboration consists of a kind of mutual sponsorship, where EOS promotes Prosilas as a service center, and Prosilas advertises EOS as a 3D system provider. Indeed, Prosilas’ laboratory sometimes is used as showroom for the EOS systems where the customers of EOS can give a look to the machines while they are working. In these occasions, Prosilas can get in contact with those companies which are deciding

whether to buy an EOS system or not, and since these decisions could take time, in the meanwhile the potential customers of EOS patronize services from Prosilas. This collaboration often concretizes in the organization of close thematic events in which parts of the EOS network get in contact to each other for sharing ideas, commercial objectives and list of clients. For Prosilas the participation at those kinds of events is beneficiary because thanks to those occasions, it can easily get in contact with new clients, which could be either a services center or “first prototypers”<sup>25</sup>. With some of these clients, Prosilas is carrying out a relationship that lasts for more than one year.

#### **IV.3.4 People involved in the supplier-customer relationship**

When it was asked to the CEO who is involved in the supplier-customer relationship, it came to light that from Prosilas side about five people, in different roles and at different levels of the organization, are involved in the relationship with the supplier, while from EOS side, there are mainly two people and different technical assistants.

Analyzing the situation from the Prosilas side, both CEO and CTO of Prosilas are directly involved in the relationship with EOS. The CEO oversees all that concerns

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<sup>25</sup> Companies, usually medium-large, that get orders for rapid prototyping which are then partially turned over to other service companies such as Prosilas

the cost analysis of the newly offered products, also analyzing if they fit with the Prosilas' market and customers expectation. Furthermore, she organizes the above-mentioned events with EOS. The CTO and Production Manager Giulio takes care of the technical aspects, so he represents Prosilas in solving technical problems. The other two people who are directly involved in the relationship come from the production area: the senior technician and an employer of processing and estimates. The latter takes care of everything about inbound materials, stock, replacement parts and billing of these and of maintenance, while the former backs up Giulio Menco for the resolution of technical aspects. The fifth person involved is the administrative employee who takes care of the routine operations.

Vanna, the CEO, underlined that she usually wants to involve both Giulio Menco and the senior technician when it comes to advanced negotiations, because the CTO usually has positive attitude toward the employment of new technologies due to his passionate approach, while the senior technician is the one that has a more critic approach because at the end of the day he is the one which uses the products. As she said, *“we like to play the good cup bad cup game in the negotiation”*.

Concerning EOS' counterparties, Prosilas is in direct contact with the Regional Manager of EOS Italy, which is the person in charge of taking over Prosilas' requirements and the person with whom Vanna Menco organizes the events. He has his office in the Italian branches in Milan. However, the Italian Regional Manager cannot take all the decisions, so sometimes he is the go-between Prosilas and EOS

headquarter in which the After Sales Italy and Customer relationship specialist is responsible for everything related to Prosilas supply contracts. With respect to the technical assistant, usually EOS sends to Prosilas the one that is available accordingly with the timing of the intervention. Overall, the technical assistant should be Italian, nevertheless sometimes happens that it is sent a German one, and as it emerged from the interview, the fact that is not always the same person seems to be not a problem neither for Giulio Menco nor for Vanna.

Provided that these are the reference contacts for Prosilas, when it has some requests which fall outside the technical assistant's knowledge, they forward these requests to the assigned team able to satisfy the requirements of Prosilas, for example when Prosilas requests for some machine customization, the company usually gets in touch with some EOS engineers.

Concerning the frequency of their contacts, as emerged from the interview, Prosilas and EOS are constantly in contact. It is difficult to assess the number of times they get in contact, however it is reasonable to say that twice a week Prosilas get in touch with the technical assistance, which represents the most frequent contact, while the orders are placed twice a month.

Regarding the procurement process, Vanna Menco underlined that it was something that Prosilas had to adapt with respect to the EOS necessity. In the beginning, Prosilas was used to place the order once a month but then, due to the considerable

amount of the material required and the limited availability of it in the EOS stock, they agreed to place more frequent orders reducing the amount required.

### **IV.3.5 The atmosphere of the relationship**

As conceptualize by the interaction model, transactions take place in a contest that is not a neutral setting. The establishment of satisfying exchange relations, in other words a pleasant atmosphere, modifies and is modified by single exchanges<sup>26</sup>. Therefore, in order to understand the context in which the exchanges take place, throughout the interviews some parts were aimed to grab as much information as possible regarding the atmosphere of the relationship with EOS. The central aspects which were discussed regarded the level of confidence that exists toward EOS, the degree of cooperation that Prosilas has with the supplier, the conflicts that arise and the reasons beyond these, and the power-dependence degree of the partnership.

When the conversation with the CEO turned to the degree of trust, it came to light that the good level of confidence that Prosilas has in EOS is primarily related to the long experience that EOS boasts in the SLS technology. When it occurs that the company assess another supplier of the SLS technology, it happens that both CEO and CTO decide to remain on EOS systems because of its thirty years of experience

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<sup>26</sup> IMP Group. (1988). *International marketing and purchasing of industrial goods: An interaction approach*. Wiley.

in this market. As pointed out by the CTO, *“the experience of companies which were born after the expiration of patents cannot be compared with the experience of EOS which registered these patents. However, this confidence is not unconditional, indeed recently it has been started to be questioned because the technological environment is changing, brand new patents have been registering and EOS seems to be too slow and strict with respect to these new trends”*. The second reason which has been important for the building of a trustworthy long-term relationship with EOS has been the reliability of its services, and the favorable exchanges especially with technical assistance.

In addition to the mentioned reasons that push Prosilas to trust in EOS, the frequent and profitable informal contacts between Prosilas and EOS management have also been sustaining the trustworthy climate of the relationship. However, due to the recent renewal of EOS management, something has changed also in this sense, indeed *“when the former Regional Director was in charge, he was used to give us educational information, not just commercial. He advised us about the problems we could have had in case we had chosen this machine instead of that”*. These good informal exchanges seem to be less frequent also because of the shorter experience of the new managers.

Shifting on the second aspect which has been the object of observation, during the interview, various events that underline the collaborative and cooperative atmosphere of the relationship have emerged.

As said above, some collaborations are going on from the commercial point of view. These collaborations can sometimes take the form of considering the participation in trade exhibitions with the support of the supplier. For example, when it comes for Prosilas to decide whether to participate or not to an exhibition, often Vanna Menco get in touch with the Italian EOS Regional Direct in order to get some feedback about whether it could be productive for Prosilas to take part to it or not. Furthermore, it can also happen that EOS encourages Prosilas to join a fair pointing out that the questioned trade fair is profitable in order to reach the market that Prosilas is aiming for. With the purpose of creating this cooperation, Prosilas and EOS share their respective commercial objectives with each other.

Recently, this cooperation is evolving in the way that, for those customers who ask for the mini-series production, Prosilas and EOS go together to the client in order to be more effective in the advertisement of the SLS technology for this kind of production. This collaboration has mutual benefit, on the one hand, it increases the possibility to get more orders of mini-series production, which is one of the strategic objectives of Prosilas, and on the other hands, the more the orders of mini-series production are, the more powder will be sold by EOS.

Further cooperation has been established from a technical point of view, for example the one of the “American SLS Printer”. EOS is currently selling a SLS machine on the American market which attracted the attention of Giulio Menco. Since the questioned machine does not respect the European regulation, Prosilas gave to EOS the full availability for working together on the machine in order to adapt it for the European legislation. They are still working for an agreement to get this deal done.

Even though so far it has been described an overall good atmosphere, the relationship between the two companies is not exonerated by some conflicts. Currently, the biggest problem seems to be that EOS is too rigid because of the big size of the company. As said by the CEO “*sometimes this rigidity of our supplier is an obstacle to the collaboration and slow us down*”. It is relevant to understand that this kind of rigidity is found only in relation to the German part of the organization and not with respect to the Italian branch. In fact, as said by the interviewees, the Italian part of the company realized that this rigidity could lead to dissatisfaction among customers, therefore the Regional Director is pushing the German part to adapt and become more flexible. This rigidity is also seen by the CEO of Prosilas as a source of risk for EOS, which “*risks to go out of the business or, in the best scenario, be bought by some other group*”, and consequently a risk for Prosilas.

In addition, another source of conflict has been observed from the cultural point of view. For example, once the CEO emailed the German office in order to get information about the TPU<sup>27</sup>, but she did not receive any answer. After one year, when the Regional Manager offered to Prosilas the new TPU, Vanna Menco said to him that she was procuring this material from another company because she asked the Customer Relationship in München, but the latter did not answer. In order to find out the reason beyond the missing answer, the regional manager went back to the email, and he found out that Prosilas did not receive any answer due to the grammatical structure of the email which instead of being a peremptory statement, it was an open question.

This is only one example, but from the interviews it emerged that this kind of incomprehension in some cases can lead to problems.

To conclude the overview on the relationship atmosphere, let us shift on the dependency-power degree between the partners.

The fact that Prosilas has only EOS systems in its SLS laboratory could lead to thinking that it is in a dependency position in respect to EOS, however Prosilas seems to be strategically important for EOS. This is firstly because it is the only Italian company which uses the EOS P 770 and the one with the biggest machinery park, and secondly because Prosilas spends about one third of its turnover only for

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<sup>27</sup> It is a kind of material which Prosilas is currently using but it is not supplied by EOS.

the supply of EOS' materials (about 1 million per year). Considering that the Italian market is the second European market of EOS, and Prosilas is one of the biggest Italian customers in terms of supply of polymers materials (about 1.2 tons monthly) it is reasonable to believe that there is an equable distribution of power between the partners.

#### **IV.3.6 The technical cooperation on the EOS P 770**

Prosilas during its operation on the 3D printing market has developed a good knowledge of the EOS systems thanks to its intensive use of the machines and because, being Giulio Menco a mechanical engineer, he often gets his hands on the machines.

During the interview two episodes emerged which can be referred to the excellent technical exchange between the companies. One is concerned the customization of a machine that Giulio Menco asked to get done in order to increase the flexibility of the printer, the other refers to a technical problem that was solved thanks to the experience of Giulio Menco and the expertise of EOS engineers.

Overall, EOS machines are designed to work with a given material. When Prosilas bought the EOS P 770, Giulio Menco asked to EOS to strive for the customization of the machine that would have allowed him to use more than one material in order

to get the maximum benefit possible from such big building volume. He gave the idea to the product manager, and the latter agreed with the customization. Without falling into technicality, the idea was to replace the machine power supply and to add a carriage for the loading of the powders. The Prosilas request was accepted and successfully satisfied, and nowadays Prosilas can use every kind of materials on the EOS P770, moreover this machine is also used for testing new powders (such as the TPU).

Further combined interventions on the P 770 occurred, but in this case, they were aimed to solve a technical problem of the machine. In particular, the problem was related to the temperature of the printer. Due to the failure of an internal part, the *polimetro*, after a certain number of processes the machine was used to go into lockdown. It happened a couple of times that EOS technical assistants changed the aforesaid part, but since the problem persisted Giulio Menco got into the broken part in order to understand the problem. Once recognized the problem, Giulio Menco communicated it to EOS which asked to meet with him in order to understand it. Once understood the problem, EOS retrofitted the broken part, and nowadays the update has been applied to all the EOS machines. Prosilas was the first which got the retrofit, and it was for free because it was only thanks to help of Giulio Menco that EOS was able to solve the problem.

As explained by the respondents, when these articulated technical adjustments of machines are performed, various meetings take place. Most of them are technical committees that are made in Munich, so the CTO and the senior technician travel to Germany and there they work together with the EOS technicians in order to share the problems and figure out the way for solving them.

#### **IV.4 The partnership with 4D Engineering for the CAD design**

The services Prosilas provides to its customers go beyond the mere 3D printing, sometimes it is asked to do the CAD design too<sup>28</sup>. In the beginning the company was organized to offer CAD design services also, but when the volume of business started to grow, the management decided to focus only on the activity the company was good at, thus Prosilas decided to give up with CAD design service.

However, being this service essential for some customers, especially for the big ones, it was established a partnership with a local company specialized in this kind of services in order to import these competences. Nowadays, even though there is no written agreement between the companies, Prosilas and 4D Engineering often go together to customers in order to guarantee a full-ranging and high qualified

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<sup>28</sup> Computer-Aided Design, it is the digital design of the part that needs to be printed. The file containing the design is one of the inputs of the 3D printer.

service. As explained by the CTO: *“It happened recently when Alpha<sup>29</sup> presented to us its problematics and what it needed. In the prototyping service Alpha asked was also included the CAD design so, as it happens in this case, I involved 4D Engineering in the business. We went together to the customer and we divided up the tasks. They handled with the CAD design and we curate all was about the production of the prototype”*.

#### **IV.5 The relations with other 3D service centers**

The list of 3D printing technologies and processes continue to grow as 3D printing is always changing. At the moment, there are about twelve different kinds of 3D printing technologies that can be gathered on the base of the materials they print. Basically, the main grouping can be done distinguish among: Plastic or Aluminide, Resin or Wax, Metal and Multicolor<sup>30</sup>. Because the pace of innovation of these technologies is getting faster and faster, and the capital required for the investment in such cutting-edge systems is enormous, for a single 3D printing service center becomes challenging to have inhouse all those technologies. As said by Giulio Menco *“from my experience, in this sector when a company says that it can print with more than one technology, normally it does not have all of them inhouse. They make use of other service centers to affirm that they have available all the range of*

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<sup>29</sup> The name has been left out for reasons of confidentiality.

<sup>30</sup> <http://www.sculpteo.com/en/3d-printing/3d-printing-technologies/>

*technologies in order to address all the customers' needs*". In other words, it means that 3D printing services centers make use of other services centers for giving them the orders the former is not able to fulfill, either because of a lack of technology or because a lack of capacity.

This situation leads to the creation of networks made up by services centers that help each other by exchanging orders.

In fact, looking and the table of client provided by Prosilas, about 55% of its customers are companies which offer 3D printing services. However, as affirmed by the CTO, Prosilas acts not only as middle-company in between other services centers and their customers, but it also takes advantage of this scheme forwarding to other services centers the orders it is not able to fulfill internally. These dynamics set up a situation in which Prosilas has some companies in its portfolio of relations that can be either customers, (in the case they ask Prosilas for some services), or suppliers (when Prosilas uses them to make external productions).

## **IV.6 Universities and the activity of R&D**

In this ultra-advanced technology environment, the production needs to go hand in hand with the activities of research and development in order to keep up the fast innovation.

As it came to light from the interview, Prosilas started to perform the first activity of research when Giulio Menco realized that producing inhouse the *loaded materials*<sup>31</sup> was not only cheaper but also possible. The first project of research that was carried out by the company regarded the trials to come up with the right proportion for getting a functioning loaded material.

These activities of materials and processes' research are conducted both within the company, such as the case of the TPU for which the company has worked to figure out the way of optimizing the production processes, and with some research institutes, such as universities.

One of the most important partners with which Prosilas performs research on materials is a department of the University of Modena and Reggio Emilia, specialized in the research of additive manufacturing technologies. Regarding this research institute, an interesting triangulation of knowledge exchanges takes place among the questioned University, Prosilas and 4D Engineering (which is also in a partnership with this university as emerged from the company's website).

Beyond the studies carried on materials for the application on the automotive and fashion industries, Vanna Menco has decided to actively take part to researches in the field of bioprinting. It is because she perceived a market opportunity arising from this innovative sector. The research for the bioprinting was launched in

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<sup>31</sup> The loaded material is a powder which is made by polyamide 12, as a base, and then it is loaded with other material such as glass.

collaboration with a PhD of the University Polytechnic of Marche. Nowadays, in these researches are involved also other universities, such as the Polytechnic of Torino, University of Modena and University of Pavia.

The fruit of the research efforts has led to the discovery of a structure called “scaffold” which is able to let stem cell to grow.

Additional partnerships for researches on printing processes have been made with the Polytechnic University of Turin, which is specialized in the additive manufacturing technology and is also in partnership with EOS for the research and development of IAM (Integrated Additive Manufacturing).

In line with the above-mentioned media collaboration that EOS is implementing with its strategic partners, the collaboration between Prosilas and the Polytechnic University of Turin is brought, by the German AM systems provider, as a case of success. In fact, in one of the events organized in Milan last year<sup>32</sup> and sponsored by EOS, “EOS meets the media”, the Regional Manager of EOS gave an interview to an online magazine where he said: *“I believe that the world of research and entrepreneurship in Italy can draw very important lessons from the experience of the Polytechnic University of Turin and Prosilas, who have been able to innovate the sectors in which they operate by following a road still little-traveled in Italy”*.

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<sup>32</sup> <https://www.fabbricafuturo.it/ladditive-manufacturing-disegna-il-futuro-della-produzione-industriale/>

Regarding the collaboration between Prosilas and EOS for the researches on the materials, Giulio Menco clearly explained that, the willingness to share with the supplier the results of his internal research depends on the availability of EOS to involve more Prosilas in researches regarding certain machines. It is because the earlier involvement of Prosilas in the development of EOS systems gives to the small business the possibility to access to these machines before its competitors.

To conclude the overview of the research and development activities of Prosilas, it has launched a crowdfunding campaign in order to collect capital to invest in these activities that bolster its role of guide and innovator of its sector. This campaign was promoted in collaboration with Banca Macerata, which is the same financial institution that played a key role in the company's reorganization in 2007.

## V. ANALYSIS AND CONCLUSIONS

The aim of this chapter is to give an interpretation of the principal phenomena concerning the evolution of the dyadic relationship that has been observed in the presented business context between Prosilas and EOS. The questions that this analysis will try to answer are concerned with *how* and *why* those phenomena have been taken place. Of course, the observations that will be made cannot be generalized to all business contexts, but they will concern the peculiarities, uniqueness and the complexity of this particular case and its specific social and economic context. Nevertheless, the aim is to catch some dynamics that occur in particular cases such as the one of Prosilas and its single supplier of SLS technology.

The first annotation from my experience in analyzing Prosilas' business relationship, is concerned with the complexity of the phenomenon. Analyzing business relationships requests to consider several factors, each of which assumes different importance on the base of how it is related to other factors. I wanted to underline the complexity of the phenomenon to make clear that, even though the upcoming discussion will try to take into account as much as factors possible, it will be an exemplification of what happens while companies deal with each other in reality.

The upcoming discussion is structured as follows. Firstly, it will start by retracing the development of the relationship, in doing so, different aspects will be emphasized with the aim of understanding what has led the two companies to be important to each. In this case the analysis will be mainly focused on the *process characteristics of a relationship* as categorized by Håkansson and Snehota (1995). Secondly, the focus will shift from the development process of the relationship to the analysis of the exchange episodes that have characterized their long-term stage. The episodes will be analyzed by splitting them into two groups: one related to the technical cooperation on the EOS P 770, which may be actually considered part of a broader ‘first test-taker initiative’, and the other related to the recent ‘media collaboration’ between the firms. In this case the focus will be on the key moment of the interaction episodes.

Finally, the chapter will end by remarking in which way the business relationship between Prosilas and EOS has helped the development of the former.

## **V.1 Some considerations about how the relationship has developed**

Business relationships do not come into being suddenly. They are characterized by a development process that goes through different stages as observed by various authors (Dwyer et al., 1987; Ellram, 1991; Terawatanavong et al., 2007, Ford et al. 2007). In this part, it will be presented a reading of the development process of the

customer-supplier relationship between Prosilas and EOS by looking at the factors that have influenced its establishment and development.

### **V.1.1 The pre-relationship stage.**

In 2003 Giulio Menco founded Prosilas S.r.l. and contextually he bought the first 3D printer, the EOS P 380. Different factors have driven Giulio Menco in its decision to purchase the first EOS' 3D printer instead of others. Here, the aim is to look and comment on those factors.

- *The complementarity of the activities performed by the supplier.* Differently from the other evaluated supplier<sup>33</sup>, EOS does not perform activities of prototyping, benchmarking or proofing. Indeed, EOS' focus is on the activity of development, production and sale of industry-specific, application-specific and customer-specific AM systems and materials.
- *The collaborative approach to the relationship.* In fact, as emerged from the interviews, the German supplier made clear from the beginning that it would have not been a competitor of Prosilas, instead, EOS would have helped Prosilas in building up a customer portfolio by delegating services such as benchmarking and proofing.

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<sup>33</sup> From the case study, Prosilas has mainly conducted its process of selection by evaluating two suppliers: EOS and 3DSystems.

- *An offering designed ad hoc to fit in AM-based digital factories' offerings.*

The products, EOS P 380, was the 3D printer with the biggest printer volume available on the market packaged with the best printing orientation for rapid prototyping. In addition, the product was delivered with European technical assistance that, from Prosilas' point of view, was an indispensable, maybe the most important, element of the offering since their production area would have been made by only one machine.

Here it is possible to draw the first sets of remarks from Prosilas' experience. Firstly, Prosilas has actively sought the source of supply, and has accurately conducted an analysis on the gain and the pain of each supplier. Secondly, the purchasing decision of the company cannot be postponed to the mere characteristics of the products and services offered by the supplier. Instead, it has been influenced by other considerations concerning, first of all, the *complementarity of the activities* performed by the supplier<sup>34</sup>, and in the second place, the *inclination of the supplier to be cooperative*. Furthermore, considering that the EOS' offering was the most expensive offering<sup>35</sup> among the evaluated, it is conceivable that Prosilas' *decision was mainly development-problem driven*.

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<sup>34</sup> Functional fit, as pointed out by Laage-Hellman (2002)

<sup>35</sup> "EOS's machines are more expensive respect to the 3D Systems' machines, but we preferred anyway to go for them"- Prosilas CEO

## V.1.2 Developing the relationship

During the interviews different episodes have come to light that underlines how the relationship has been constantly evolving during its first decade of life, emphasizing the *dynamic nature of relevant business relationships*. Even though, it will not be possible to track a timeline of the development process, here the aim is to speculate about some aspects that have led the two partners to get closer and undertake a *cooperative interaction strategy*<sup>36</sup> in dealing with each other.

Organizations are made by people, resources are preceded by individuals and activities are performed by individuals. So, the first category of observations will concern the *people involved in the relationship*.

- What cannot be ignored in the analysis of the relationship evolution is the role played by the technical skills of the Prosilas founder and his interest in the 3D printing technology. Giulio Menco is a mechanical engineer and at the time of the company's foundation were about a couple of years that he was looking with interest at the evolution of the 3D printing technologies.
- Vanna Menco entered the company in 2009 as CEO under the internal reorganization of the company structure. During the interview she has disclosed strong ability to manage interpersonal relationships. Indeed, during the phase of data collection, she has shown abilities such as: good

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<sup>36</sup> It is drawn from the classification of customer-supplier relationship presented by Campbell et al. (1985)

active listening skills, superb language, empathy and propensity for collaboration.

- In dealing with EOS, Prosilas has also brought into the relationship the senior technician who has had an active role in the decision-making processes.
- Over the years, Prosilas has had social and technical exchanges with lots of EOS' people. From the technical assistant to the engineer, from the sales account manager to the top management of the supplier.

Here a set of considerations based on the analysis of the people involved in the relationship. Firstly, the background of Giulio Menco, have made possible for EOS to deal with a knowledgeable engineer passionate about 3D printing technology. From this, it may be speculated that EOS had strong interests in developing the relationship with Prosilas due to the knowledge of Giulio Menco, that in somehow may have enhanced the demand ability of the 3D services provide.

Secondly, the humanistic background<sup>37</sup> of the CEO conferred to Prosilas an important set of soft skills that allowed the partner to easily interface whit each other facilitating the success of the business relationship management of the supplier.

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<sup>37</sup> From her LinkedIn: she attended the Classical High School.

Both sets of skills may have been the ones that have facilitated the building of resource ties and actor bonds, creating also common resources such as the technical skills developed by Giulio Menco on the EOS machinery.

Thirdly, the fact that different individuals have interacted from both sides has shown a mutual commitment to the relationship. Furthermore, it may have been a facilitator for the establishment of a trustworthy relationship's atmosphere and may have been the premise for productive social and technical exchanges.

As stressed by the literature, the interaction between the parties leads to adaptation that may concern products, organizations, strategies, offerings or processes. The analysis will carry on by focalizing on the *adaptation that the development of the relationship has both led and required*.

- *The adaptation of the Prosilas target market to EOS technology.* In 2003 when Prosilas entered the business, the initial idea was to package an offering for architects and engineers, but when they started using the supplied technology, the current CTO, Giulio Menco, understood that the potentiality of that technology would have been better exploited in the designation of an offering for big companies.
- *Similar long-term ambitions.* Looking at the case of Prosilas and EOS, it has emerged that both companies have similar strategies and long-term ambition. Indeed, on the one hand, the EOS' declared objective is to

implement its additive manufacturing for mass production processes, and on the other hand, the Prosilas' strategic objective is to further increase the activity of mini-series in order to become a "real additive manufacturing center".

- *Constant technological/applicational consultancy.* The relationship between Prosilas and EOS has also developed thanks to the "*open and virtuous dialog*". The open and virtuous dialog may refer to the advice element of the offering. This advice was bidirectional, thus not only EOS has advice which machine to buy, but it has been also Prosilas to advise how to perfection the machines' operation while intensively used. Furthermore, the typology of advice has been adapted to the situations, shifting from simple technical advice to more advanced marketing advice. In conclusion, it is useful to remark that that advice has been taken place both in formal or informal contexts.

As has been shown, the development of the relationship has gone through a series of adaptation. The first concerned the Prosilas' target market. This adaptation may have helped the development of the relationship by building the first layer of activity links between the two parties, so it may be seen as the outcome of the interaction and the precondition for further development of the relationship. Regarding the long-term ambitions of the two company it is only possible to

speculate whether was Prosilas to adapt its long-term ambition to the EOS' declared objective, or it was EOS to define its own ambition basing it on market analysis. However, this 'long-term ambition fit'<sup>38</sup> may explain why the two companies have increasingly got involved in the relationship. In the third place, the adaptation of the advice element of the offering may be read as a requirement for further development of the relationship making EOS important for Prosilas and vice versa. In fact, on the one hand, EOS has become important for Prosilas demonstrating its problem-solving ability in reducing Prosilas' needs and market uncertainties. On the other hand, Prosilas has strengthened its position in the EOS' portfolio of relationships by showing its demand ability aimed to solve application uncertain of the German AM systems provider. A key role here has been played also by the expertise of Giulio Menco as an engineer. This advice has contributed to the relationship development by reducing the technological and social distances between the parties.

Besides the strategical important that Prosilas has gained in the EOS' portfolio of relationship, thanks its ability in solving EOS' application uncertainty, the Italian company has gained an important place in the EOS portfolio of relationship also thanks the huge amount of business brought to the German systems providers. The ten 3D printers and the 1.2 tons of polymers material purchased monthly, that

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<sup>38</sup> As it has been defined by Laage-Hellman (2002)

corresponds to an expense of 1 million euro per year, make Prosilas the biggest Italian customers of EOS. It is reasonable to say, that this intensification of the purchases has been, together with the above-mentioned abilities and interests of the parties, what allowed the parties to get even closer and develop the relationship from a simple purchasing-selling relationship to a more valuable cooperative relationship. Of course, the intensification of the commercial exchanges has not been a free-of-adaptation process, indeed in the 2015 Prosilas had to move its production site to the newest and bigger plant in order to host the machinery park.

In conclusion, another set of remarks from the Prosilas experience, can be made looking at the development process of the customer-supplier relationship.

As has been seen, the intensification of the commercial exchanges has been only one of the several aspects that have shaped the development of the business relationship making the partner mutually important to each other. An important aspect that has marked the development of the relationship has been the people involved in it, their skills, their position and their role. Furthermore, indispensable for the development of the relationship has been the reciprocal adaptations. These adaptations have made possible for the two parties to increase the benefit of the relationship in the face of adaptation costs.

### **V.1.3 Long-lasting relationship marked by cooperation**

After a decade of relationship development, in which the parties have gradually got highly involved in the relationship, the two parties decide to formalize their cooperation. Prosilas, for a period of time, have been the ‘first test-take’ of EOS’ materials and services. The AM systems provider was used to deliver to Prosilas new materials, that they were testing in their headquarter in Germany, in order to get some feedback about the usability of these materials on the machines. The informality of this ‘first test-taker’ disappeared when in 2017 the two companies agreed on the conditions for exchanging the EOS P 770. Prosilas was one of the first customers<sup>39</sup> in Europe, and the first in Italy, to whom EOS delivered its cutting-edge system.

Furthermore, the close collaboration between the two parties had recently developed when Prosilas and EOS started to implement the ‘media collaboration’ project. It is a project in which EOS and Prosilas collaborate for marketing purposes.

These two projects will be deeply analyzed in the next paragraph. However, it is possible to make a point on the facts analyzed so far. Firstly, to undertake those

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<sup>39</sup> EOS presented the new machine at the end of 2016, and Prosilas disclosed its new purchase in the beginning of the 2017.

complex and demanding collaboration projects, the relationship has needed to develop for a decade. Secondly, the collaboration has been possible because EOS has recognized in Prosilas a skilled and motivated user with whom undertake joint technological development, Von Hippel (1986) define these as “*lead users*”. Secondly, the nature of these projects, the first has been purely technical while the second has been more related to marketing technology, may be a signal that in order to fully exploit the advantages of long-term business relationships, cross-the-border collaborations need to be undertaken.

## **V.2 Some remarks about the key interactive episodes**

Besides the consideration based on the analysis of the relationship development, further consideration may be made with respect to the interactive episodes that have characterized the two above mentioned projects. In the following it will be given an analysis of the episodes that have characterized these projects.

### **V.2.1 ‘First test-taker’: Prosilas as “lead user”.**

Prosilas has been the first Italian company to whom EOS delivered its EOS P770. This 3D printer is characterized by the biggest building volume available on the market and increased productivity of 20% with respect to the average of EOS machines. So, in 2016 the two partners further developed the relationship by

formalizing the technical cooperation. From the case studies it has come to light a couple of episodes that can be considered in relation to this technical cooperation between the parties. In the following, those episodes will be listed and then some considerations. Those are the two episodes:

- *Product adaptation to Prosilas' requirement.* The EOS machines are designed to work with a given material. When Giulio Menco realized the potentiality of the EOS P 770 if customized for working with all the materials, he proposed it to EOS' engineers, and they agreed with the customization.
- *Retrofit of the polimetro.* With the intensive use of the EOS P770, the machine used to go into lockdown. After a couple of times that Giulio Menco pointed EOS out the problem, he decided to put his hand on the machine and figured out the problem. After a meeting where Giulio Menco discussed with the EOS' engineers its solution, EOS improved its product by retrofitting all the machines it had on the market.

Those two episodes underline how important Prosilas has become across the year for EOS. in the following some consideration about the episodes.

In the first place, some considerations may be made on the role played by the resources owned by Prosilas.

Firstly, *the knowledge of Prosilas in using the machines*. For EOS is not easy, or even impossible, to have a satisfactory level of knowledge of its technology in the using setting<sup>40</sup>. The know-how of Prosilas, generated thanks to the intensive use of EOS systems across the years, has been a precious piece of knowledge from which EOS has got great value solving the problem of the *polimetro*. Without doubt, the *retrofit* of the machines has been possible also thanks to the technical knowledge of Giulio Menco and his team that has developed over a decade of business relationship with EOS.

Secondly, *the knowledge of what the final customers want*. Being closer to the final customers of the supply chain, Prosilas can easily “hear” what the final customers ask and report it to EOS. This closeness may explain why Prosilas asked for the customization. This request for customization may have brought to EOS some final customers’ needs that may be taken into account in designing the offering for other EOS direct customers. Nevertheless, this has generated advantages also for Prosilas in terms of cost rationalization.

In the second palace, it is important to note that that cooperation on the development of EOS products, generate advantages that are beyond the resolution of a technical problem or benefit in terms of costs. Those experiences represent for the small

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<sup>40</sup> Håkansson and Waluszewski (2009) identify three different moment and contexts that need to be brought together for turning technology into commercial products. They are: developing setting, production setting and using setting.

company an opportunity to develop knowledge about the EOS systems. The created knowledge from this interaction can be exploited by improving its innovative capabilities and designing better offerings for its customers. As emerged from the case study, Prosilas has a strong interest in giving continuity to these kinds of technical collaboration. In fact, recently, Prosilas asked to EOS to let its technicians get their hands on an America machine that needs to be adapted for the European legislation. They are still negotiating to get the deal done. Prosilas, on its side, offers to EOS the possibility to get the door opened on its internal activity of Research and Development on particular materials.

In the third place, it is remarkable how the gained role of Prosilas as “lead user” allowed the company to have access to the EOS P 770 in advance with respect to its Italian competitors. Thus, this kind of relationship with the supplier is an advantage not only because the knowledge created in those interactions may allow Prosilas to design better offering, but also because this privileged position in the customer portfolio of EOS allows Prosilas to get the advantage of the first mover in the market.

To conclude the consideration regarding the ‘first test-taker’ initiative, it is important to underline that so far only benefits have been discussed, however, both parties have supported the costs of collaborating, that, one for all, is the time employed in these kinds of projects.

## V.2.2 ‘Media collaboration’ for developing solutions jointly

The second emblematic example that underlines the mutual importance of the two parties, is represented by the ‘media collaboration’. It consists in a kind of mutual sponsorship, where EOS promotes Prosilas as a service center, and Prosilas advertises EOS as a 3D system provider. EOS carries on these kinds of collaboration with its key partners.

Differently from the above-discussed cooperation, in this case the collaboration has been on the development of marketing technology, rather than 3D printing technology. In the following it will be listed a series of episodes that may explain the reason beyond the decision to collaborate. This list will be completed with some observations.

- *Prosilas’ first contact with the EOS potential customer.* Prosilas’ laboratory is often used as a showroom for the EOS systems where the potential customers of EOS can give a look to the machines while they are working. The fact that Prosilas get in contact with the EOS’ potential customer may lead to a situation in which Prosilas can use its experience in using the EOS systems and its demand ability for advice EOS in understanding the problems that the potential customer has. Furthermore, EOS may benefit

from the combination of its problem-solving ability and the one of Prosilas for designing an offering for the questioned customer.

- *Organization of close thematic events.* The media collaboration often concretizes in the organization events in which parts of the EOS network get in contact with each other for sharing ideas, commercial objectives and list of clients. Several aspects need to be considered with respect to these events. Firstly, thanks to these initiatives EOS may indirectly address some Prosilas' need or market uncertainties by let it talk with other partners that may have had the same problem. Secondly, Prosilas during those events may easily *get in contact with new clients*. Thirdly, the participation in these events may help Prosilas *in developing an 'insidership position' in the network*<sup>41</sup>, which could be useful while trying to mobilize resources from the network for innovative purposes. Fourthly, in these events Prosilas may find other AM-services center which operates with different additive manufacturing technologies (such as DLP, FMD, DMLS and so on) with whom may deal with for *expanding its portfolio of services or exploit its technology externally*<sup>42</sup>.

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<sup>41</sup> In the chapter 3 it has been discussed the importance of the insidership position for SMEs while carrying on innovation processes.

<sup>42</sup> The concepts of internal and external exploitation of technologies is presented by Ford et al. (2007).

- *Present 'small-series' services jointly.* Recently in light of the 'media collaboration', it happens that EOS and Prosilas proceed together to Prosilas' customers that ask for 'small-series' services. This way of doing may allow the parties to coordinate their action for reaching a common object, which is to increase the business for these services. In fact, going together to the customer, it is possible to design an offering that benefits from the problem-solving abilities of both parties. In other words, they join their respective problem-solving abilities, as it has observed also in the case of Prosilas first contact with EOS' potential customers, in order to understand and solve final customer problems.
- *Sharing of goals.* Sometimes it happens that the two partners sit together to share commercial goals. This sharing of goals makes possible for Prosilas to take advantage of the EOS' marketing experience for reaching its goal. In fact, often the two partners get in contact for discussing whether or not it is advantageous to participate in a certain business exhibition at the light of the commercial goal.

What we can conclude from the Prosilas experience in cooperating with its supplier in these different projects is that the establishment of long-period relationship, characterized by cooperation, is subjected to the existence of a mutual benefit of

the involved parties. In fact, even though each episode brings benefits sometimes for the customer, some other for the supplier, in the long term the benefit should be for both. When the two parties decide to undertake these cooperative projects, it is no longer just the customer that buys the suppliers' products and abilities in solving its development and rationalization problems, but it is also the supplier who decide to buy the abilities of the customer in solving its own problems. Of course, what the supplier buys is not reciprocated by a sum of money, but it is reciprocated by a higher closeness of the supplier to the customer problems and uncertainties.

Secondly, size does not matter. As it has been observed across the analysis even though Prosilas is much smaller than EOS, sometimes the Italian company owns valuable resources to combine with the one of EOS.

Thirdly, while intense interaction takes place, it is possible that the abilities of the suppliers and the customers are not only interchangeable for ensuring that mutually satisfactory transactions take place between them (Ford et al., 2007), but also combinable for ensure that satisfactory transaction take place between one of them and a third parties.

### **V.3 Some observations about critical aspects of the relationship**

So far, it has been discussed only about the positive outcome of the interaction. However, even if well-functioning, long term relationship is not exonerated by criticalities. In the following they will be listed and commented:

- *Risk of institutionalization of the relationship.* For long-term relationship there is the risk that being in contact for long times, the parties may incur in the eventuality to take for granted some routine. It may be the case of the 'not replayed e-mail', in which the German office did not replay to the requirement for the characteristics of a new material. Probably the German office did not replay because it took for granted that the exchange of information regarding new products would have taken place between Prosilas and the EOS Regional Manager.
- *Risk of changing the people involved in the relationship.* Three years ago, EOS reorganized itself and changed most of its management. After 13 years of relationship between Giulio Menco and the former Regional Manager (RM), the latter was substituted. Giulio Menco pointed out that when the former Regional Manager left the position, some experience was lost. The new RM was younger and less experienced, so also the informal exchanges were less experienced. Another criticality is represented by the fact that, in

case of companies' reorganization, the social dimension of the business relationship may need to be rebuilt from zero.

- *Asymmetry of the organizations.* Prosilas employs one-fiftieth of the people employed by EOS. Different dimensions lead to different procedure and process of decision making, it is reasonable to say that in general big companies takes longer than small company to decide. This asymmetry of velocity may probably be related to the smaller detriment. In fact, when a thick layer of activity links is built, the fact that the bigger has a slowest decision-making process may slow-down the smaller. It has been observed in the Prosilas case, when the CEO complained about the rigidity of EOS that sometimes slow both the collaborative relationship and Prosilas down.

### **V.3 Final conclusion**

In this thesis it has been investigated the business relationship between Prosilas and EOS. The aim of the study was to understand the importance of the supplier relationship for the development of the customer.

To conclude this thesis, it will be summarized the main conclusion that we can draw from the Prosilas experience.

The first conclusion regards the *team function of the relationship*. Even though Prosilas is a small company, it has turned out to be one of the most important business relationships of the EOS' customers. In fact, the inter-organizational collaboration that has taken place on the ESO P 770 has allowed the parties to solve a problem that was difficult to solve for the parties if they would have acted alone. Secondly, the close collaboration, from a marketing point of view, has allowed the parties to act jointly in order to solve problems of third parties.

The second sets of conclusions regard the *development function that the business relationship* has for Prosilas. Prosilas when it started had 3 people and one 3D printer, nowadays it has twenty employees and boasts one of the biggest additive manufacturing laboratories in Europe. It is possible to believe that this development has been helped by the dyadic relationship with its supplier in which constant technological and social exchanges between the parties have helped Prosilas in improving: offering, innovation capability and positioning.

Firstly, the fact that Giulio Menco and EOS engineers have been working together on problems, has allowed the Prosilas engineer to enhance his technical skills, and more in general the technical knowledge of Prosilas as an organization. This enhancement has allowed the company to improve its offering in terms of cost and delivery, so to gain advantages over its competitors.

Secondly, as said, Prosilas has in somehow created value for EOS by solving its problem. The value created for its supplier may have been the key to get access to

some resources that not all the EOS' customers can get (such as the EOS P770 in advance, the tips on the market trends, the access to other EOS' relationships and the likes). The access to those resources, in addition to the innovative culture acquire by the continuous social exchanges with the German company and the ability to innovate of the Prosilas' top management, may have stimulated the innovation capability of the Italian small company. Innovation capabilities that have been strengthened by the insidership position that EOS has helped Prosilas to build in the network of Italian additive manufacturing.

Finally, as said, the relationship had recently evolved in a media collaboration. It may be said that this collaboration has helped the customer to build the brand identity and improve its positioning in the market.

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