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IoT Technologies, Services and Business Model Innovation

The case of an Italian manufacturing company

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Chi saremmo senza tutti coloro che sono entrati nella nostra vita?
Sicuramente un po' meno noi stessi.

Questo traguardo lo dedico a chi, da sempre, è parte del mio quotidiano e a chi, nel tempo, lo è diventato.
Perché è anche grazie a loro, che mi hanno supportato e sopportato, se sono riuscito a raggiungere questo obiettivo.

Non posso, infine, non dedicarlo a chi oggi non è qui, ma che, sicuramente, avrebbe fatto il tifo per me.

Il candidato dichiara che il presente lavoro è originale e non è già stato sottoposto, in tutto o in parte, per il conseguimento di un titolo accademico in altre Università italiane o straniere.

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Firma

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INTRODUCTION & SUMMARY

THE REASON OF MY DISSERTATION – The purpose of this dissertation is to analyse how an Italian manufacturing firm deals with three phenomena that today are influencing and radically changing companies around the world: Industry 4.0, servitization and innovation of business models. In particular, through a case study supported by an internship, we want to investigate these phenomena and their impact on the company itself. It is interesting to discover how academic studies and different theories could be applied in a specific context. An empirical analysis in this form, even if it cannot be considered as a promoter of generalized conclusions, can however give an interesting picture of what is a case of success in the Italian manufacturing sector and how, such a company, is facing the issues mentioned above. The case study gives the chance to understand how the company assesses its future and whether or not it is ready for a possible innovation of its business model, following the trends that are developing today. The research has shown that the management is aware of the challenges that the company has to face and is working to respond quickly and with innovative solutions and in line with other companies in its sector. Of course, the path to success is not the easiest one, and it is characterized by issues that can emerge both internally and externally. Overall, for about a year now, a whole series of projects have been developing. These projects should help the company to better exploit the opportunities that the IoT and, more generally, Industry 4.0 are offering. At the same time, there is also a more long-term vision of what the path must be to implement and improve the servitization process. The idea of approaching a new business model is something that is present among managers, but, perhaps, they still do not have a defined common vision. If in the future the path should

provide this solution, it will be necessary for the company to implement the organizational context of which it is formed, so as not to obtain a failure. The organizational context, in fact, is a key element for achieving success in the implementation of a business model. A final point, not to be underestimated, is the fact that today's changes in technology are increasingly rapid and therefore it is necessary to be ready to modify the path in response to these trends. The dissertation is structured on four chapters with which, firstly, the three phenomena mentioned are examined and then, the analysis developed by some authors are applied to the case study itself, by means of research protocols.

FIRST CHAPTER – INDUSTRY 4.0 AND DIGITAL TRANSFORMATION – The main purpose of the first chapter is to give a general overview of what is the phenomenon of Industry 4.0, where it was born, and which are the studies in which we talk about it. It then explains the digital transformation and its fundamental role in businesses, its potential and, above all, its implications. Then, a focus on Italy and on how the country is dealing with the Piano Impresa 4.0 is made. It continues analysing which are the incentives and on what companies are investing. To this, it is added a comparison with other countries in the world, so as to place Italy in a specific context and then, analyse the differences. Finally, two surveys show two different point of views about the Industry 4.0 phenomenon in Italy. The first tells how the adoption of IoT technologies related to Industry 4.0 depends on the size of the company itself, the second is based on a worldwide research carried out by Deloitte, which in Italy focused on 100 executives and on how they perceive the I4.0 phenomenon as a whole.

SECOND CHAPTER – SERVITIZATION AND DIGITAL SERVITIZATION – At the beginning of the second chapter, an explanation about the concept of servitization is given, in particular, its definitions and its evolution. Quoting several studies, we report the most common factors that can influence companies in taking the lead in servitization. With a more in-depth analysis, the factors that lead to the internalisation or externalisation of a service are highlighted. In addition to these elements, the topic regarding the obstacles that arise against the development of servitization is faced. We can summarize these "barriers" as: product-centric mindset, CAPEX logic and the so-called service paradox. Then, the capabilities and resources that could increase the service strategy in the B2B

are resumed. The chapter continues with an academic subdivision of services based on the variables "nature of the value proposition" and "service recipient", as well as the paths that can lead to a successful system of servitization. It concludes showing what is happening in Italy regarding the servitization topic and whether companies are ready to face this challenge or not.

THIRD CHAPTER – RESHAPING THE BUSINESS MODEL – The third chapter focuses on Business Models. In particular, it begins with an introduction to the concept of Business Model, its definitions, the typical classification made by Osterwalder and Pigneur (2004) and another perspective developed by Chesbrough (2007). A first sub-paragraph is based precisely on the deepening of the Business Model Canvas, its blocks and the typical elements that are found within it. The chapter continues with a paragraph about the concept of Business Model Innovation and the literature about it. Two topics are then presented. The first one concerns the relationship between IoT and Business Model, and how the first influences and impacts to the elements of the second. The role of IoT in B2B companies is also explained. The second topic investigates the relationship between Industrial IoT (IIoT) and Business Models. After these two sub-sections, practical examples are analysed, focusing on empirical case studies. These models will be used as research protocols to develop part of the fourth chapter, dedicated to the case study. The chapter ends with the topic of duality in Business Models, i.e. the analysis of the phenomenon that is created from the moment a new business model has to interface with the traditional one carried out by the company. Speaking of this duality, the concept of ambidexterity is introduced, and it is also used in the following chapter.

FOURTH CHAPTER – THE CASE OF AN ITALIAN MANUFACTURING COMPANY – The last chapter focuses entirely on the case study carried out in the company thanks to an internship. After a brief introduction of the company, the sector in which it operates and my role as an intern within it, the chapter is broken down mainly into three paragraphs. The first is the development of a survey on the topic of business model innovation. In particular, it analyses how the management of the company assesses the impact of digital technologies on some characteristic elements of its business model and how, these digital IoT technologies, will influence the future of the business model itself. The second paragraph concerns a second survey, always focused on the same subjects as be-

fore. In this second case the aim is to verify how they evaluate a possible new business model based on the IoT (and IIoT) and if this could conflict with the traditional model or if there could be synergies. This survey continues interrogating the population regarding which could be the location to place this prospective business model. Finally, a short questionnaire is developed in order to study in a more in-depth way the topic of ambidexterity in the company. In the last paragraph we tried to study the organizational context by submitting a questionnaire to the entire population of the company.

INDUSTRY 4.0 AND DIGITAL TRANSFORMATION

1.1 A general overview

The Industry 4.0 project started as an initiative of the German government in 2011. The initiative was aimed at developing a new concept of German economic policy based on high-tech strategies (*Mosconi*, 2015). Thanks to Industry 4.0 and the concepts that are brought with it, interactions between humans, humans and machines and between machines themselves are allowed.

Industry 4.0 represents technological progress in three respects (*Roblek et al.*, 2016):

- Digitization of production (information systems for management and production planning)
- Automation (systems for data acquisition from the production lines and using machines)
- Linking manufacturing sites in a comprehensive supply chain (automatic data interchange)

The communication flows underlying I4.0 lead to the creation of a system defined as Knowledge Management 4.0[1]. With this KM 4.0 there is a development of a system that allows you to continuously exchange information about the needs or individual situations of online vendors, health care workers, manufacturers, co-workers, etc. This kind of communication, together with CRM systems, takes place between machines, which send data to the cloud via the Internet and then have to be analysed. These automations have the purpose of ensuring that companies adapt to the customer in the best possible

[1] *KM 4.0, Dominici, Roblek, Abbate, & Tani, 2016.*

way, so as to offer products and services "value added". Through KM 4.0 it is possible to improve the precision with which marketing strategists obtain valuable content from customers and respond in real time, with the intention of modifying or enhancing customer behaviour. A major problem with the IoT is being able to control the ever-increasing amount of data collected. As a consequence, there are concerns about how to ensure that all data is stored securely and that privacy levels are such that unauthorized parties cannot access it.

According to *Sommer* (SME, 2015), the development of technologies such as 3D printing or the development of online sales services have had a strong impact on small and medium-sized businesses. It is up to companies to understand how to take advantage of all those "smart" related products and services in order to obtain as much information as possible (opinions and psychological or socio-demographic factors that influence the decision-making process of using connected products).

An essential aspect is certainly the development of digital thinking. Only in this way will people be able to manage processes in a new way. Not being able to read, analyse and understand the nature of the data certainly brings a disadvantage in terms of competition. Another factor that could be decisive for the success or not of a company in the field of Industry 4.0 and digitization, is to give employees more autonomy of action and independence in taking decisions.

The use and sale of smart technologies on the one hand leads and will continue to lead to job security and increased demand from the final consumer, with a consequent increase in income (compensation effect), while on the other hand, certain jobs will disappear, replaced by new production technologies and processes (redundancy effects).

In Germany, the same government, several state-owned companies, universities and research institutions are studying and looking for ways to develop fully automated smart factories. The European Union itself encourages research in the field of smart technologies. An example is the Horizon 2020 funding plan.

It is fair to say that this fourth Industrial Revolution uses ICT (Information and Communication Technologies) and data to connect the internal phases of value creation, vertical company levels and entire factories along the supply and value chain.

Of course, Industry 4.0 also means change both strategically and operationally. According to *Schumacher et al*. (2018), one of the major problems encountered is certainly the

implementation of the theory - for example with regard to vertical or horizontal integration -. What the authors of that study develop is a 10-point model to guide companies to Industry 4.0. Their literature review shows the presence of two different approaches to provide guidance in Industry 4.0. The first one is the holistic approach, which uses and evaluates Industry 4.0 in all its aspects and then tries to derive success factors. The latter, instead, is the specific approach which focuses on a limited number of aspects with a higher level of detail[2].

The study by *Schumacher et al*. (2016) found that for many companies (especially SMEs) is difficult to grasp the idea of Industry 4.0 in its overall concept and some specific concepts. Two different problems for companies (or business units, …) are recognized:

- The difficulty of relating their specific domain and their particular business strategy
- Problems in determining their state-of-development about I4.0 vision and, as consequence, failing to identify concrete fields of action, programs and projects.

In particular, companies perceive the concept of I4.0 as highly complex without a strategic guidance; they lack a clear idea of the I4.0 resulting in uncertainty regarding benefits and outcomes; they fail to assess their own capabilities in Industry 4.0 which restrains from taking any coordinated measures.

1.2 The digital transformation phenomenon

This Fourth Industrial Revolution, compared to the previous one, focuses on end-to-end digitization of all physical assets and integration into digital ecosystems with value chain partners. For manufacturers, Digital Transformation is really important and according to PWC[3], out of 2,000 manufacturers, 86% expect to see cost reductions and revenue gains from their digitization efforts over the next five years.

In the digital transformation there are 4 trends that manufacturing companies, and in general all actors involved, must take into account (*Newman*, 2018):

[2] To know more about these two approaches, Roadmapping towards industrial digitalization based on an Industry 4.0 maturity model for manufacturing enterprises, Schumacher, Nemeth, Sihn, 2018.

[3] PricewaterhouseCoopers, one of the Big Four auditing and consulting firms in the world.

Connected consumers and customized experiences: consumers are much more connected to the industry through social networks, interactions and data analytics. An example of this is the buyer journey for a new vehicle. Automotive industries have managed to offer a wide spectrum of customization, even for entry level cars. Internal and external colours, different technological elements, Wi-Fi, wireless charging, etc., are all elements that show how much car manufacturers listen to the desires of consumers. All this can be done while maintaining production efficiency.

Empowered employees: in the sense that employees can be defined as empowered when they have direct access to the information they need most. Collaborative tools, and remote work allow workers to access everything they need from anywhere in the world with any device.

In addition, decision-making processes are faster and thanks to the improvement of systems such as ERP, CRM and Customer Experience Mapping, now you can visualize the entire supply chain, developing marketing strategies and making more informed decisions about products.

Optimized production: with this technological development, production is able to adapt more quickly to customer requirements. Today, in fact, virtually all companies can take advantage of tools such as cloud analytics devices, understanding where production can be speeded up, where there are the greatest number of errors or waste, which are the equipment that requires more maintenance, etc.

Transformed products: just think about the means that track your use of gas, or the health of the engine, or machines that predict failure and the need for maintenance. These are all solutions that save millions of dollars. Thanks to technologies such as AR or VR, it is possible to develop and test product designs without them entering the assembly line, saving time and money.

Some studies highlight implications and critical aspects of digital transformation in the 4.0 Industry age (*Lee et al.*, 2017). We sum up some of them through this table:

Implications and critical aspects of digital transformation	
Digitization leads to a large increase in performance	Companies need to start making big investments
Companies (in every sector) expect a significant reduction in costs. (e.g. companies that develop a planning system on the cloud in order to be more integrated with horizontal partners and consequently improve efficiency and reduce inventory)	The development of investment in the Industry 4.0 will be an important factor of competition and will be seen as a qualifier for funding. Particular attention will be given to investments in digital technologies, software, connectivity devices, etc. Companies are also investing heavily in training their employees, hiring new specialists and making organizational changes
Digital culture drives transformation	It is important that pilot projects are created. From the vertical integration of one or two manufacturing sites, to the horizontal one, selecting key suppliers.
Internal challenges could emerge, such as training and digital culture	The capabilities that a company needs must be identified in detail.
The globalization of companies must be accelerated, but without losing the various regional aspects	A strong focus on building a digital trust must be maintained, ensuring information security and an environment of trust.
While strong product customization often requires regional manufacturing capabilities, Industry 4.0 brings companies and countries closer together. The same value chains and data networks promote globalization	An ecosystem approach must be developed. A breakthrough performance is in fact achieved by always being one step ahead of the customer's needs, delivering value to the clients through digital technologies.

Table 1.1 "Sum up of implications and critical aspects of digital transformation", own elaboration considering Lee et al. (2017)

1.3 Italy and the Piano Impresa 4.0

In 2017 a governmental plan concerning the Industry 4.0 was launched in Italy as well. To have a historical picture of the situation with which Italy arrives in 2017 with Industria 4.0, it is necessary to frame industrial production taking into account the impact of the global crisis (2007/2008).

The negative impact of the latter on the industry production, in fact, was 26.1%. And we have arrived to 2017 with a recovery of 8%[4].

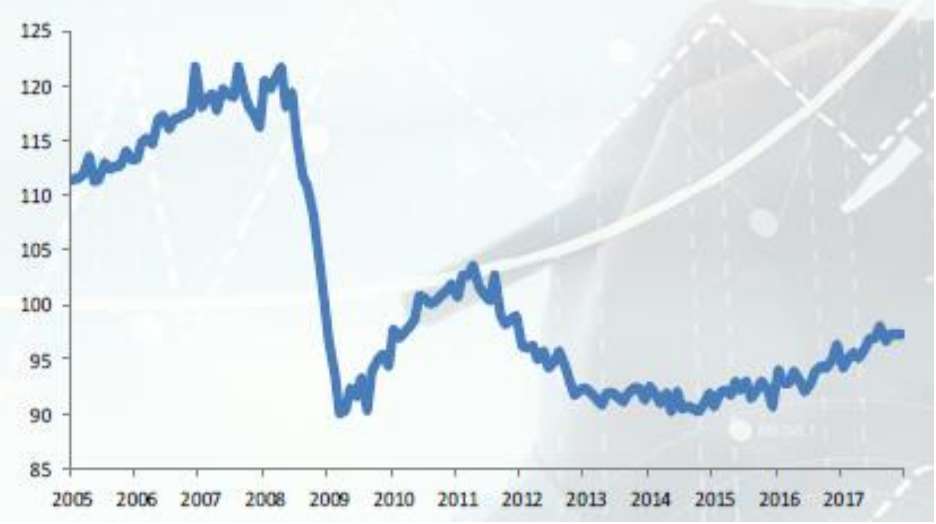


Figure 1.1 "Industrial Production (Average for 2010 = 100)", Italy's National Plan IMPRESA 4.0, Results from 2017 – Actions for 2018, Ministero dell'Economia e delle Finanze, (2017).

The targets set for the period 2017 - 2020 are broken down into four sub-groups: innovative investments, skills, enabling infrastructure and other support measures. For the first, for example, private investment is expected to grow by €10 billion (from €80 to €90bn) between 2017 and 2018. For the second subgroup, instead, an increase of 200,000 university students, 3,000 managers specialized in the I4.0 field and about 1,400 PhDs in the I4.0 field are expected.

Noteworthy are the graphs drawn up below by ISTAT[5] and concerning the investments in digital technologies. In Figure 1.2 you can see how big companies are the ones that can drive the investments. It can be seen that recruiting becomes a key element in 2018, with important numbers for both large and small and medium enterprises.

[4] *Source: ISTAT; Analysis: MISE.*

[5] *"Indagine sul clima di fiducia delle imprese manifatturiere" ad hoc form (November 2017).*

The second graph, Figure 1.3, concerns the role of incentives in 2017. The breakdown is made by company size and geographical location. Super depreciation[6] has been the most widely used incentive for the same percentage of large, medium and small companies, especially in central Italy and the North-East. The so-called Nuova Sabatini refers only to SMEs.

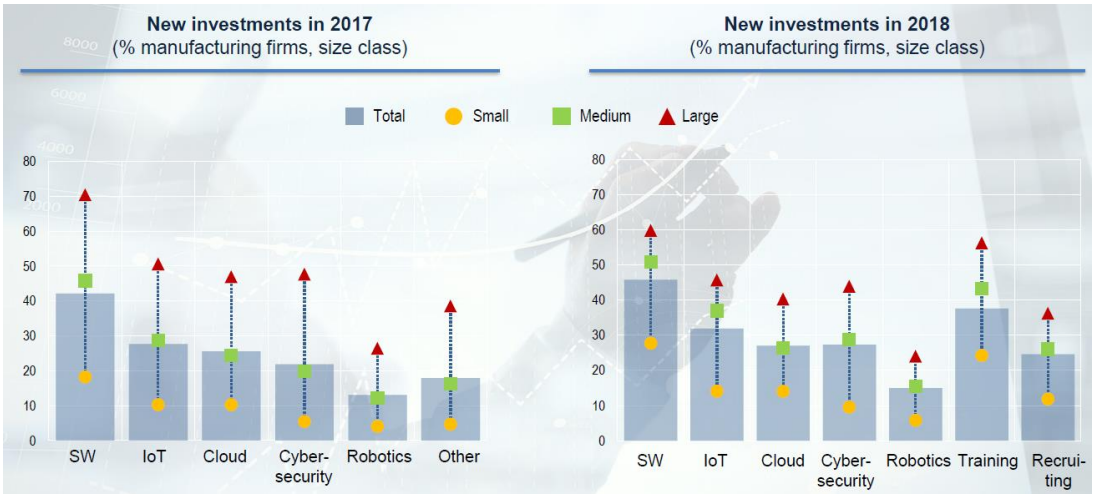


Figure 1.2 "Investment in Digital Technologies", Italy's National Plan IMPRESA 4.0, Results from 2017 – Actions for 2018, Ministero dell'Economia e delle Finanze, (2017).

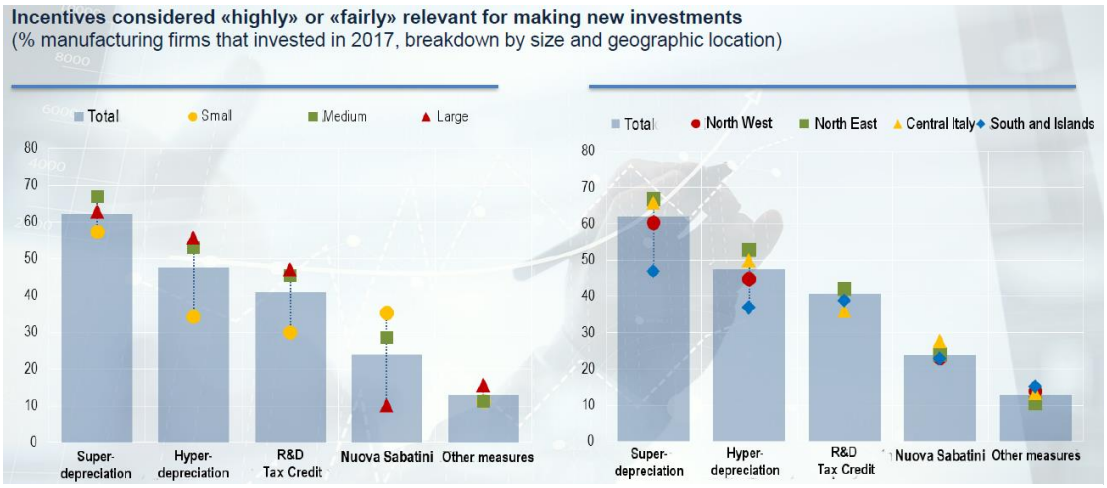


Figure 1.3 "The Role of Incentives in 2017", Italy's National Plan IMPRESA 4.0, Results from 2017 – Actions for 2018, Ministero dell'Economia e delle Finanze, (2017).

[6] *Definition of 2017 Hyper/Super Depreciation: super-deduction of 250% for investments in new tangible assets Industry 4.0 and 130% for investments in other new tangible assets. "Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie" Deloitte Italy, 2018.*

Early stage investments are growing in Italy, as shown in the following chart[7], Figure 1.4. But in any case, compared to other European countries, it is well below average.

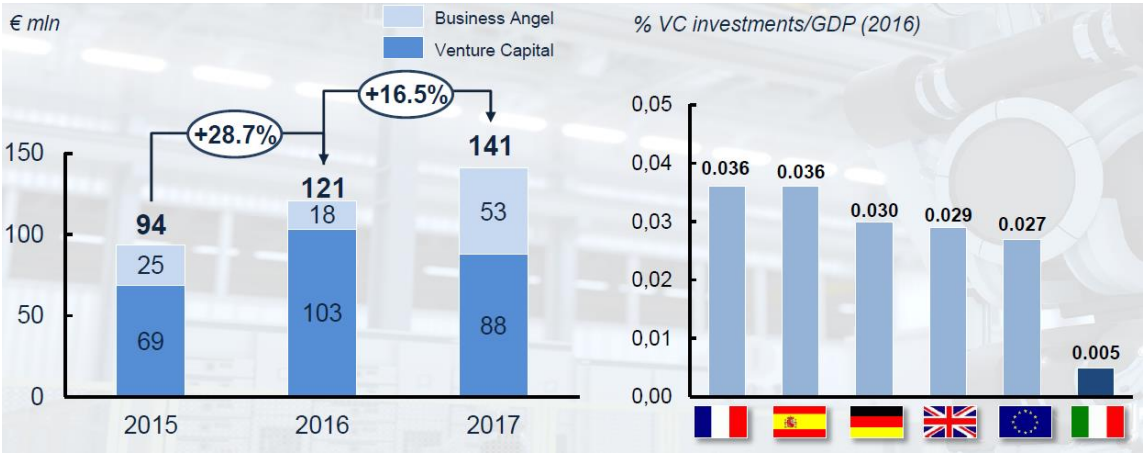


Figure 1.4 "Early Stage Investments", Italy's National Plan IMPRESA 4.0, Results from 2017 – Actions for 2018, Ministero dell'Economia e delle Finanze, (2017).

As far as the skills factor is concerned, three national networks have been formed: a first one called "Punti Impresa Digitali" (to increase awareness and basic knowledge about I4.0), a second one, "Innovation Hubs" (advanced training on specific solutions in certain areas) and a third one, "Competence Centres" (advanced training and development of research and experimental development projects).

Still in terms of skills, we can say that Industry 4.0 poses challenges to employment. In particular, professional profiles who still do not exist today or are just beginning to emerge will be needed, and consequently it will be necessary to create new university curricula to train new students on digital skills.

The National Plan "Impresa 4.0"[8], among other things, includes a series of initiatives with the aim of developing the enabling technological infrastructure for Industry 4.0. Two examples are the strengthening of the ultra-wideband and the definition of open-source standards for machine-to-machine communication. According to OECD estimates of June 2017, Italy is among the world's leading countries in terms of M2M communications.

[7] *Source: MISE study; Bureau van Dijk 2017; Invest Europe 2016 Report.*

[8] *The "Piano Nazionale Impresa 4.0" was launched by the Italian Government at the beginning of 2017, allocating over 18 billion euros for the three-year period 2017-2020. The Plan consists of 9 main measures, including Hyper/Super Depreciation, Nuova Sabatini, Development Contracts, Innovation Agreements, etc.*

Figure 1.5 shows that Italy ranks sixth in the world ranking, and, in particular, the data shows that the sim cards installed in machines and sensors for M2M communication are 16.4 per 100 inhabitants.

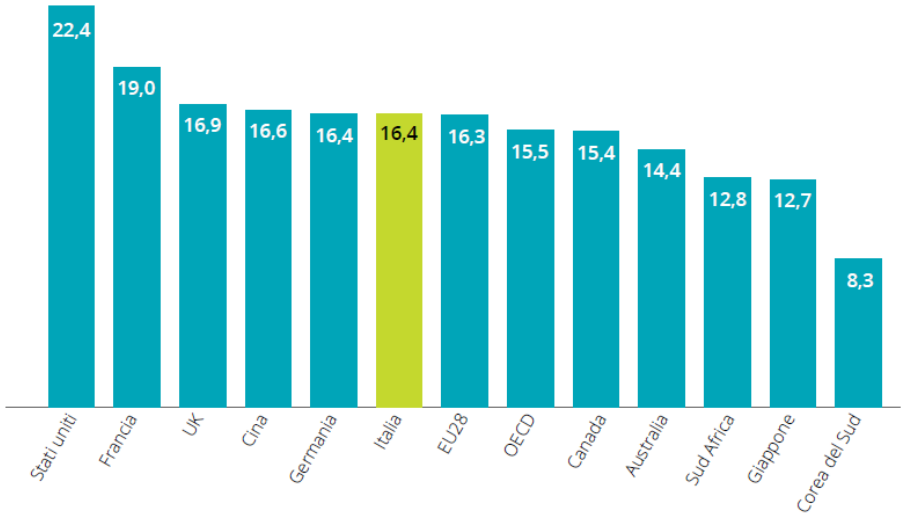


Figure 1.5 Number of sim cards for M2M communication per 100 inhabitants", Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, (2018).

Compared to 2016, the Italian IoT market grew by 32% in 2017, reaching a value of 3 billion euros. In particular, the largest areas are those of Smart Metering (980€ MLN) and Smart Car (810€ MLN), with the latter growing by 47%, ahead of Smart Logistic (+45% growth). Funds such as Smart City or Smart Home are still very dynamic (+40%, +35%)[9].

According to the Cloud Transformation 2017 Observatory of the Politecnico di Milano, the cloud market is also expanding in Italy (in 2017, +18%, reaching 2 billion euros). Mainly it is the manufacturing sector that drives this technology. On the basis of Eurostat data, as Figure 1.6 shows, the 22% of Italian companies adopt cloud technologies and this position is above countries such as France and Germany (respectively, 17% and 16%), but well below the countries of northern Europe (Finland 57%, Sweden 48%).

[9] *Smart metering: systems that allow the telematic management of electricity, gas and water meters. Smart car: vehicles equipped with mobile devices, internet connection and digital systems aimed at improving the driving experience, comfort and safety. Smart logistic: application of digital and ITC technologies to logistics activities, saving in terms of efficiency, consumption and environmental impact. Smart city: a set of urban planning strategies aimed at optimizing the quality of public services and infrastructures. Smart home: application of digital and home automation technologies to improve comfort, consumption and safety in the home environment. (Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, 2018).*

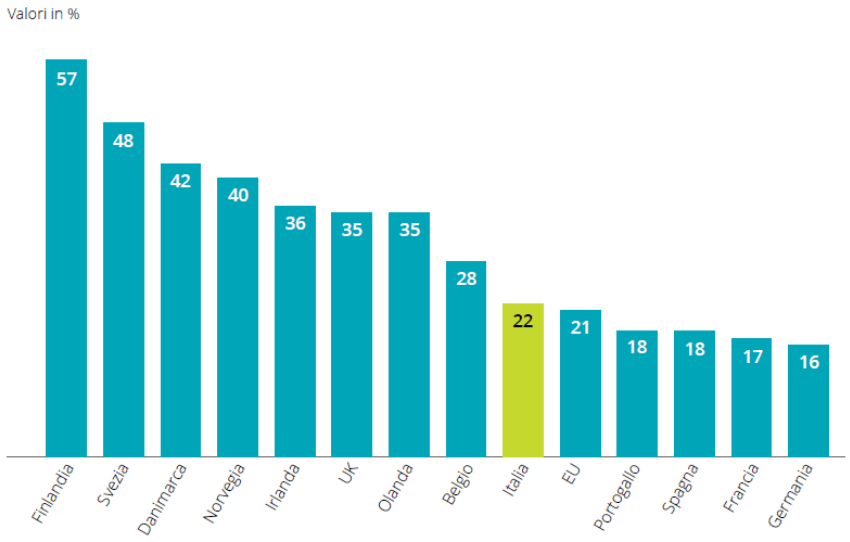


Figure 1.6 "Percentage of enterprises that have adopted cloud technologies, by country", Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, (2018).

A real problem for Italy concerns the education and training of the workforce. It is precisely in this area, in fact, that the most alarming data are collected, especially when compared with those of other countries.

According to the data presented by the Ministry of Economy and Finance, Italy has, compared to the average of other European countries, the lowest values regarding the spread of digital skills in the workforce. 29% compared to 37% of the European average, going from values such as 50% in the UK, to 39% in Germany or 33% in France.

The same applies to the rate of participation in training courses in 4.0 technologies, which is 8.3% compared to the European average of 10.8%, with peaks of 18.8% and 14.4% for France and the UK, and without considering the countries of northern Europe as Sweden, Denmark and Finland (all above 25%).

The most dramatic data are represented by Figure 1.7, in which the number of students enrolled in Higher Technical Institutes (ITS) is represented. Italy counts on 9000 units compared to the incredibly much higher numbers for Germany, France and Spain.

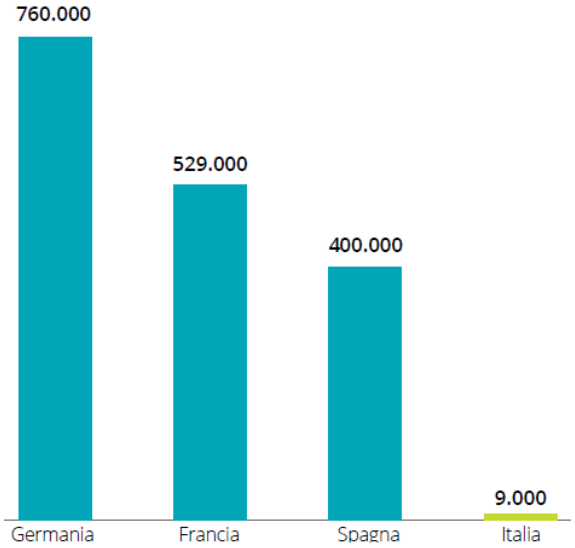


Figure 1.7 "Number of students enrolled in ITS, by country", Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, (2018).

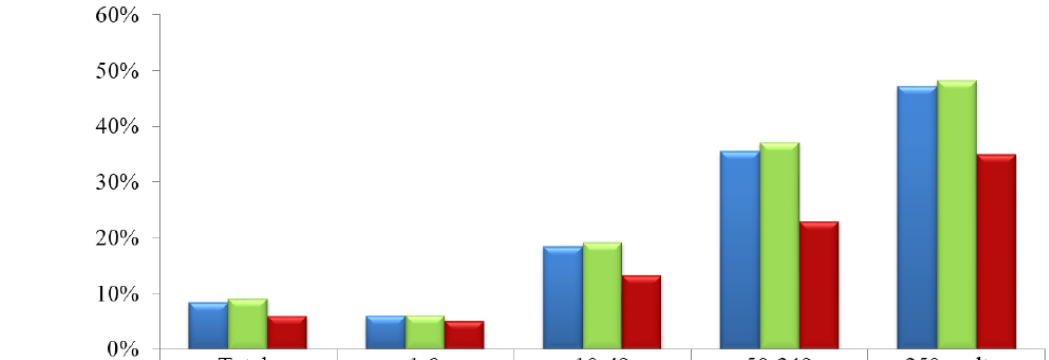
1.3.1 Two surveys

Two surveys about Industry 4.0 in Italy are also considered. The first was conducted by *Brancati and Maresca* on a sample of 24,000 companies, while the second is by *Deloitte Italia* and is based on a sample of 100 executives. The latter is part of a larger case study by Deloitte and Forbes on a sample of 1600 executives from 19 countries around the world.

The first case illustrates how the adoption of technologies[10] related to Industry 4.0 is proportional to the size of companies. Even companies in southern regions have more or less constant growth, as Figure 1.8 shows.

The same considerations are made for those companies that have at least one planned installation/use of 4.0 technologies.

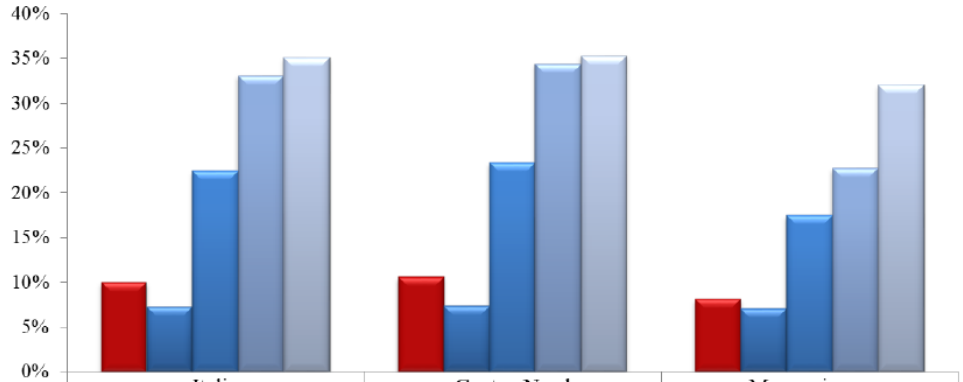
[10] *The technologies related to industry 4.0 that the authors consider are 11 (including advanced manufacturing solutions - robots -, additive manufacturing – 3D printers -, augmented reality, horizontal integration, vertical integration, cloud, big data/analytics).*



	Totale	1-9	10-49	50-249	250 e oltre
Italia	8,4%	6,0%	18,4%	35,5%	47,1%
Centro-nord	9,2%	6,3%	19,3%	37,1%	48,2%
Mezzogiorno	6,1%	5,2%	13,3%	23,0%	34,9%

Figure 1.8 "Enterprises using at least one technology 4.0", Industria 4.0 in Italia: diffusione, tendenze e qualche riflessione, Raffaele Brancati e Andrea Maresca, MET 2017-18.

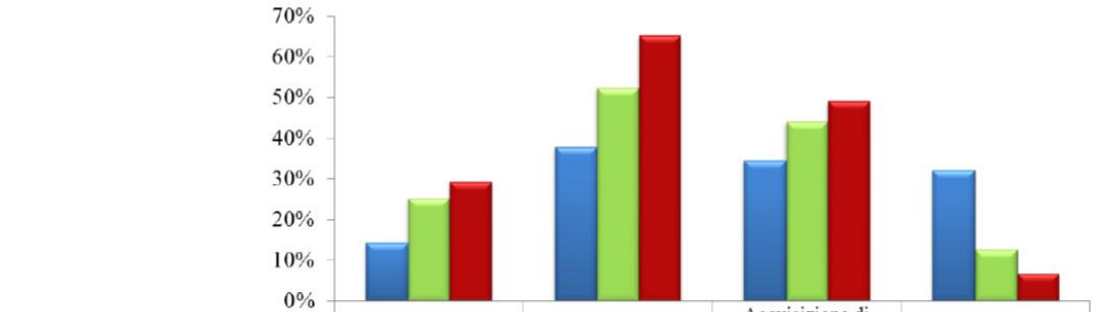
From Figure 1.9 we can see how the medium and large companies in the Central and Northern Italy have practically the same percentage of planned interventions. In the south, however, only large companies are in line with the percentages of the Centre and North.



	Italia	Centro-Nord	Mezzogiorno
Totale	10,0%	10,6%	8,1%
1-9	7,3%	7,4%	7,1%
10-49	22,5%	23,4%	17,5%
50-249	33,1%	34,4%	22,8%
250 e oltre	35,1%	35,4%	32,1%

Figure 1.9 “Companies that have at least one planned intervention”, Industria 4.0 in Italia: diffusione, tendenze e qualche riflessione, Raffaele Brancati e Andrea Maresca, MET 2017-18.

Another very interesting graph (Figure 1.10) summarizes the ways in which companies have addressed the critical issues in competencies[11].



	Nuove assunzioni	Formazione del personale	Acquisizione di servizi e/o collaborazioni esterne	Nessuna azione
Imprese tradizionali	14,2%	37,9%	34,5%	32,2%
Imprese tradizionali con interventi 4.0 programmati	25,4%	52,4%	44,1%	12,7%
Imprese 4.0	29,5%	65,2%	49,2%	6,9%

Figure 1.10 "Ways in which companies have addressed critical issues in their competencies", Industria 4.0 in Italia: diffusione, tendenze e qualche riflessione, Raffaele Brancati e Andrea Maresca, MET 2017-18.

Staff training is a very important and heartfelt topic in 4.0 companies. More than 65% of them have in fact focused on staff training to respond to the lack of skills come to present with the introduction of elements of technology 4.0. Collaboration and consultancy services are in second place.

The key points for companies 4.0 (or in any case for all those companies that have planned interventions) are product, process and organisational innovation. Investments in machinery are also decisive.

The survey concludes that the spread of 4.0 technologies is quite significant, with peaks in larger companies, but also with large numbers in SMEs. More than 20% of companies with more than 10 employees and almost 50% of large companies are involved in Industry 4.0. There is also a very high expectation of diffusion among SMEs in the next two years (also in southern Italy). Obviously, depending on the size, there are different objectives and different technologies adopted (e.g. large companies with efficiency objectives, small companies with objectives of new business models or quantitative improvements).

[11] *Note: The line total is greater than 100% as up to 2 response modes could be indicated.*

The second survey, instead, focuses more on the executives' point of views. Deloitte analyses topics such as the degree of preparation of companies for new technologies, the vision for future challenges, the socio-economic impact of Industry 4.0 in companies, organizational and managerial changes as well as the new professions of the future.

A first data is the one concerning the opinion of their company with respect to competitors in the Industry 4.0 field. 30% of respondents consider their company more advanced than their competitors in adopting 4.0 technologies and 44% consider themselves at the same level.

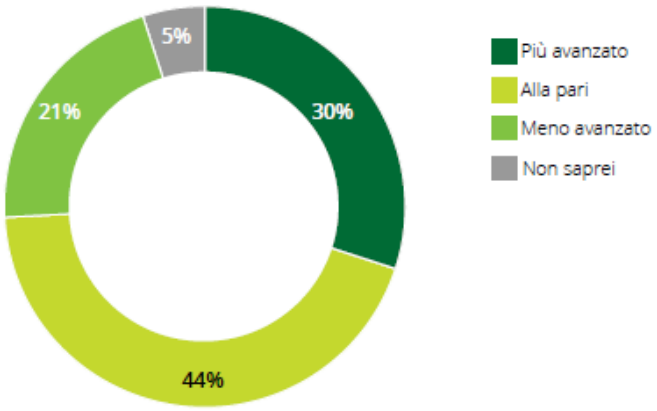


Figure 1.11 "Evaluation of the positioning of your company in the Industry 4.0 field, compared to competitors", Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, (2018).

What emerges, as shown in Figure 1.12, is that the executives interviewed are aware that the Industry 4.0 will impact on business models and, in particular, increasingly smart and autonomous technologies will be the trends that will most affect companies in the next 5 years.

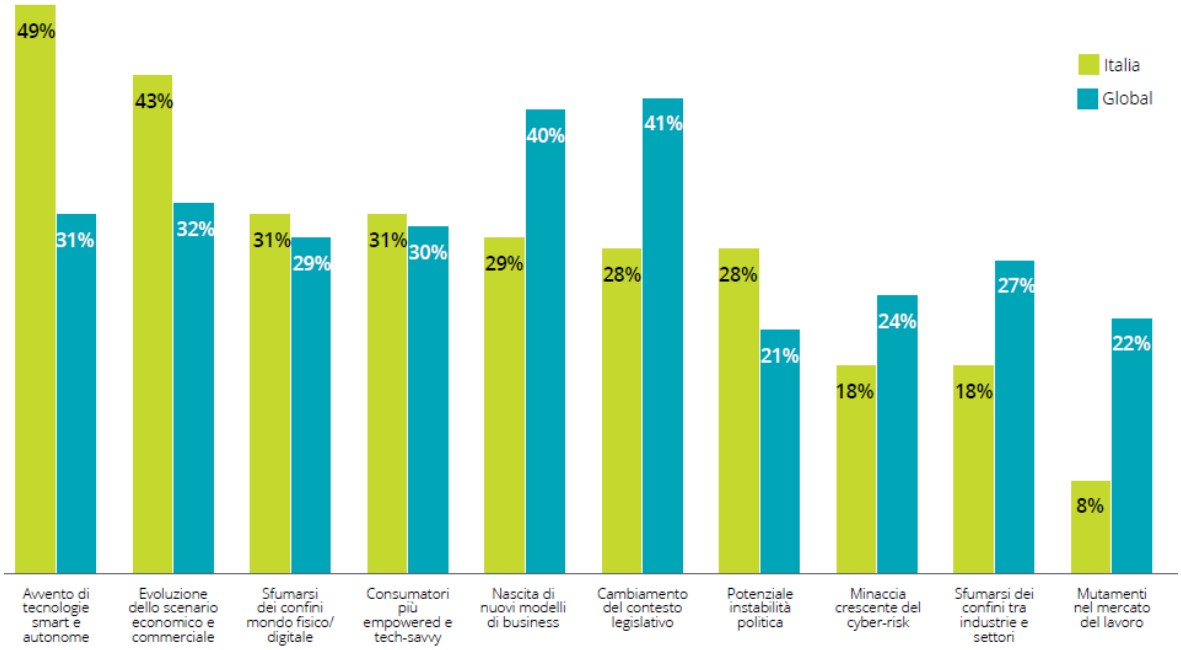


Figure 1.12 "Which of the following trends will have the most impact on your company and your business in the next 5 years?", Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, (2018).

However, uncertainty among Italian companies is widespread. Many of the managers interviewed admit that they do not have a solid business case capable of supporting the implementation of new technological solutions.

"We have a strong business case that can support the implementation and development of our new technology solutions."

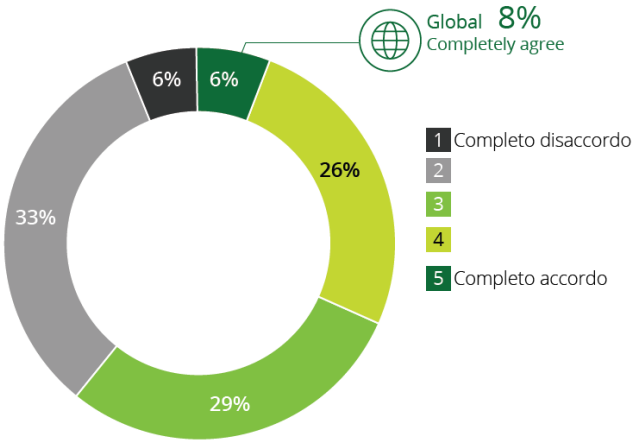


Figure 1.13 "Degree of agreement: Business case", Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, (2018).

The problems do not only concern the development of new technologies, but also the need to make internal organizational changes. Just over a third of respondents say they are "aware of the way these technologies will change the organizational structure of their business".

The percentage of those who define themselves as fully aware of how the Industry 4.0 will make organizational changes is only 5%, compared to 22% at the global analysis level.

"We are aware of how these technologies will change our workforce and our organizational structure."

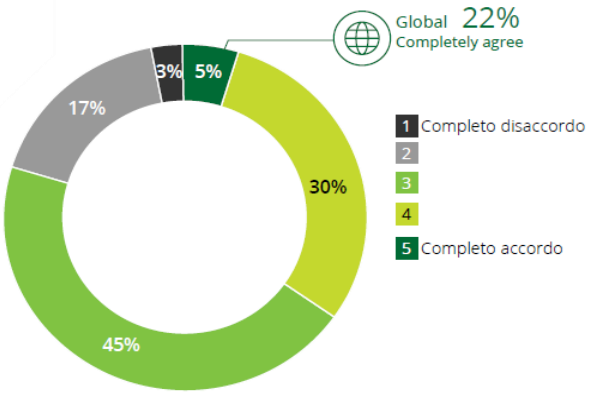


Figure 1.14 “Degree of agreement: organizational structure”, Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, (2018).

Another serious problem emerges from the next chart, Figure 1.15, which shows how the item "talent management" is the lowest for the Italian columns, compared to the global ones. In general, there is a fairer distribution of investments in the global columns than in Italy, where process development and customer/marketing support take precedence.

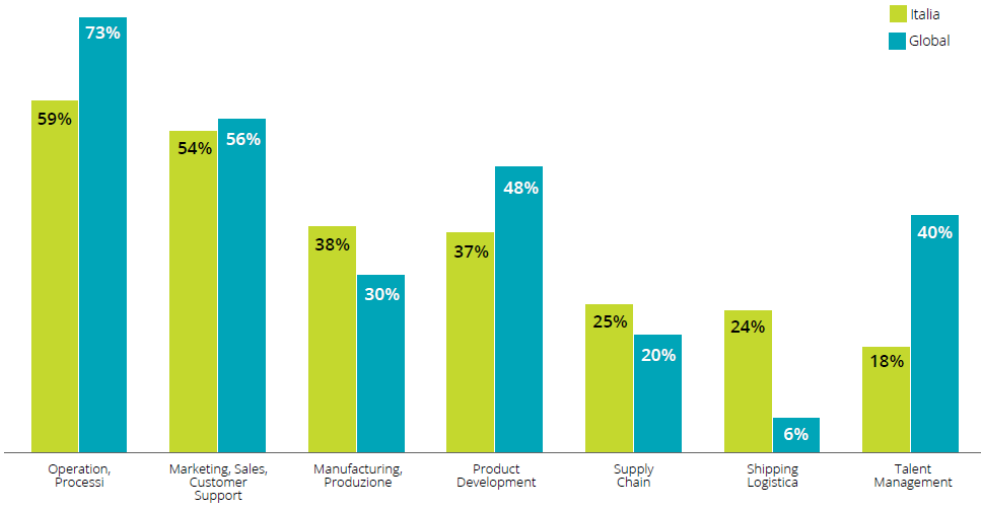


Figure 1.15 "Which of the following areas of your company are or will be most affected by investments in new technologies?”, Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, (2018).

The interviews showed that only a few managers recognize the importance of the talents and skills available in the company in driving investment in new technologies. The adoption or not of the latter is precisely linked to the scarcity of financial and human resources. In fact, from the following graph it can be seen how the adoption or not of new technologies is linked for 41% of the interviewees to budget problems and for 37% to a lack of technological know-how.

The following graphs, Figure 1.16, shows that in Italy there are no problems of collaboration with external partners (a problem identified by 10% of the respondents, compared to 38% at a global level). Even the "short-term strategic vision" seems to influence less Italian managers than those of other countries surveyed (31% vs. 43%).

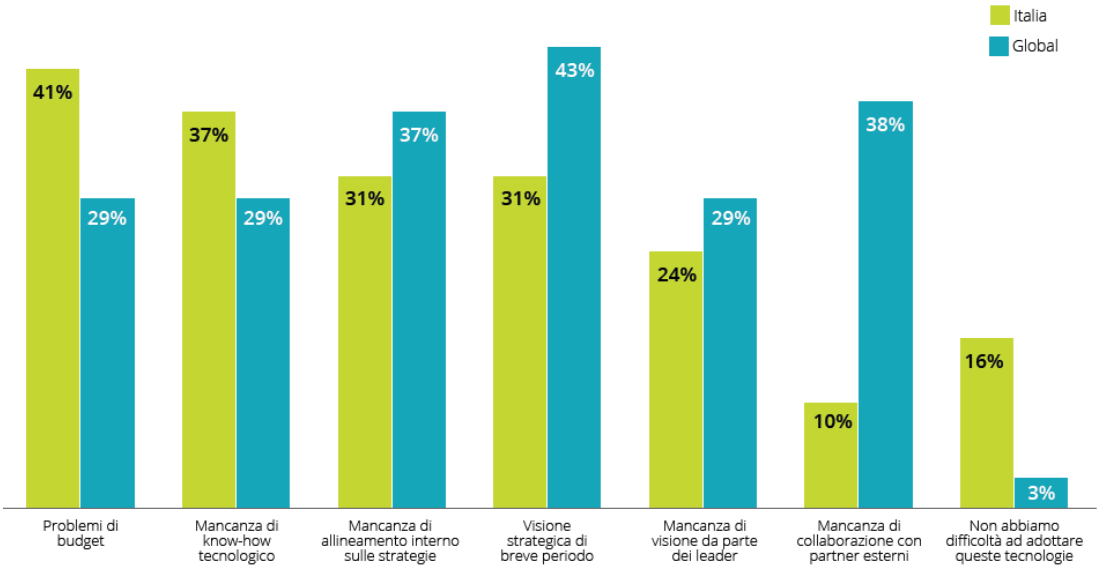


Figure 1.16 "What are the most common challenges that your organization faces when trying to adopt new technologies?", Italia 4.0: siamo pronti? Il percepito degli executive in merito agli impatti economici, tecnologici e sociali delle nuove tecnologie, Deloitte, (2018).

1.4 Conclusions

In conclusion to this first chapter we can say that the topic of Industry 4.0 is very much on the agenda in all the developed countries. The same digital transformation is a trend that is developing in all those companies that are aware of the fact that they have to actively respond to the exponential technological development that has been taking place in recent years. Entire functions or divisions are created to facilitate the flow of this new way of interfacing with the old company structures, going to renew those that are processes, products and the people themselves. The three are in fact fundamental cornerstones for transformation, and all three are certainly closely connected to each other.

By focusing on the Italian scenario, we have seen how companies actually have and are still exploiting the advantages of the I4.0. However, we are focusing on renewals and developments of processes, systems and platforms and still not given the right value to the development of skills through training and specific courses to ensure that IoT technologies are exploited to their full potential.
However, this trend must change in order to ensure that the country remains truly competitive with respect to the scenario with which it daily faces.

THE SERVITIZATION PHENOMENON

2.1 Introduction to the servitization concepts

If we search for the word services in the dictionary, we find:

> "Economic activities that do not result in ownership of a tangible asset" (Oxford English Dictionary, 1999).

It was the 1988 when Vandemerwe and Rada defined *servitization* as

> "The increased offering of fuller market packages of bundles of customer focused combinations of goods, services, support, self-service and knowledge in order to add value to core product offerings".

Since then, the concept has been considerably deepened and developed, also generating multiple definitions and theoretical-empirical analysis. Over time, therefore, the process of servitization has extended along the entire value chain, passing from industrial realities and B2B relations, to user-producer relations and relations of interdependence between economic-productive entities. Progressively, the configurations of the activities carried out by various companies have changed and the focus becomes to produce "integrated sets or systems with services in propulsive function" (*Vandermerwe & Rada*, 1988).

The shift to services – in particular for manufacturers that are offering complex engineered products - can be generalized into five trends (*Neely et al*., 2011):

1. The shift from a world of products to a world including solutions
2. Outputs to outcomes
3. Transactions to relationships
4. Suppliers to network partners
5. Elements to eco-systems

More generally, companies choose to move from a good-centric mindset to service-led growth or for protecting their existing turf and solidify their ongoing business, or for actively moving to acquire new customers, defeating competitors, and having access to greater volumes and bigger margins.

A further development of the concept is given by the terminology *digital servitization*, which could be seen as the provision of "*digital services embedded in a physical product*" (*Vendrell-Herrero et al.*, 2017), where music, taxis, hotels, aircraft engines, turbines, locomotives, etc. are examples that lead us to think that we are moving towards a redefinition of the processes of "process and product design", of the combinations of activities that lead to a certain output (material and immaterial), of its life cycle and its functionalities. The growing digital transformation in many industries opens new avenues for monetizing data and analytics by providing new services and saving costs delivery. A physical object, therefore, regardless of its objective aspects, can be seen as a set of functionalities in continuous evolution and adaptation. Arthur, in 2009, has argued that digital technologies make the techno-economic dynamic a combinatorial space, able, therefore, to create "downstream and upstream" interdependence between companies.

Servitization requires an increase in company skills to compete in a world of digital ubiquity and ubiquitous computing. So, to gain a good competitive space, it is necessary to be able to make strategic adjustments, re-configurations of activities aimed at creating value and development of interactive structures on multiple levels. It must be said that the process of servitization is not irreversible anyway. There are in fact cases of de-servitization for financial reasons, inability to create interdependence, lack of integration of knowledge, etc.

A very important feature of the servitization is the customer centricity. Increasingly, companies are developing customer-specific and tailored solutions. Those solutions often require a combination of products and value-added services. A classical B2B example is the one of Rolls-Royce with its "Power by the hour" engines for aircrafts.

Interactions with clients are becoming more and more relational and less transactional. To stay competitive, businesses need to understand the client plans to use the products, as well as the goals for that use. Moreover, companies need to understand customer

needs and develop a proposition for meeting those needs. Proposition that goes far beyond the product itself.

2.2 The environmental influence

Following the path of the book "*Service Strategy in Action"* (*Kowalkowski, Ulaga,* 2017) it is possible to distinguish between an external and an internal environment within the company that lead it to enter the world of servitization.

Among the many external factors linked to the market environment, the authors mention:

1. The *saturated and commoditized market*. Companies are facing a saturation of demand in core product areas, so capturing greater revenues and profits through value-added services is particularly important in situations where the number of new units sold is by far outnumbered by the installed base of good sold. When facing commoditization, the most common mistake companies make is failure to understand the changing market conditions and adapt accordingly.
2. The *customer's pressure*. Customers expect their suppliers to help them cut production costs and increase productivity.
3. The *proliferation of competition.* Industry incumbents, competitors with low-cost strategies from emerging markets, distributors, consultants and pure-service actors are all possible competitors. Moreover, in many industries, the main threat comes from disruptive innovators outside the traditional industry boundaries.

For the internal factors we can highlight:

1. The *exploitation of product and technology expertise*. Exploiting engineering and technology expertise, in fact, may allow suppliers to provide new services that focus on restoring or improving the functionality of products.
2. The *capture of customer relationship value*. Service is also an element to create and capture more value from relational assets. A service represents an opportunity to realize substantial turnover during the entire product lifecycle (installation, maintenance, repair, retrofitting, …), and it could also be a weapon to be able to acquire new customers.

3. The *opening of new market opportunities.* In launching innovative services and hybrid offerings, companies can create a lasting differentiating element that their competitors have a difficult time copying.

2.2.1 Are services internalized or externalized?

Brown (2009), with a survey of more than 300 firms, showed that most of them keep their services separate from the rest of the operations, creating separate units. *Goffin*' (1999) studies lead to the conclusion that the marketing channel used for support can have strong influence on the quality of support received and perceived by the customer. Usually the costs of a direct channel are high, but, at the same time, the revenues and competitive advantage generated are able to offset them. The firm analysed by Goffin, however, offered its customer basic product services. In the *Mathieu*'s (2001b) discussion, instead, we can see a development of two extremes: internalizing and outsourcing, and a hybrid arrangement: partnering. Internalizing means keeping all service operations in-house, outsourcing means give all the responsibility for all service provision to partners and hybrid configuration is sharing the responsibility for services between manufacturer and partners.

Following Gebauer, Kowalkowski, Oliva and Kallenberg, in an internal organizational arrangement, the core activities associated with service provision are performed in-house, regardless of whether the product and service organizations are separated or integrated. As opposite, in an external arrangement, external firms perform the core service provision activities. In between we have a hybrid configuration with internal and external arrangements.

The relationship between external factors and internal characteristics is very important and it has been analysed through the contingency theory by authors such as *Burns and Stalker* (1961), *Galbraith* (1973) and *Lawrence and Lorsch* (1969). The theory simply focused on which organizational design is best suited to a particular environment, where strategy, organizational arrangement and conditions in the external environment are all aligned.

An interesting topic is the provision of basic services. In fact, most of the time, these are offered together with the products. With this type of service, it is possible to exploit the knowledge and skills of the product business units (*Fang et al.*, 2008). Consequently, it

would seem that manufacturing companies develop this kind of service "in-house" compared to the more advanced ones.

However, this argument goes against the analysis of *Kowalkowski et al*. (2011a) and *Matthyssens and Vandenbempt* (2008), who argue that it is more difficult to assign complex services such as provision of extensive, process-oriented services to external partners than simple after-sales services.

Two firm-specific key factors in favours of internalization are a *high degree of service orientation* (view as the number of services offered, the number of customers to whom the services are offered, and the emphasis placed on the services) and the *customer centricity*, which implies a long-term, relationship-orientated business approach. At the same time, one problem that may arise is about limited financial and human resources; this could rise problems in the internalization service provision. For example, in case of smaller customer bases for some regions, a solution may be the use of external partners in order to avoid unnecessary fixed costs. Moreover, an unclear or non-existing service strategies make it more likely that firms will choose externalization.

Nordin (2005) proposed that high service intensity favours externalization and low service intensity favours internalization, exactly in contrast with this paper of Kowalkowski who has found that firms – ceteris paribus – choose to provide high-volume services rather than low-volume services in-house. Specifically, firms are more likely to choose an internalization strategy if the resources needed to perform the service are complex and scarce. In contrast, personnel-intensive services may be externalized.

What about market-specific factors? In general, operating through service partners is more common in emerging markets. And when service partners are both customers and competitors, the situation becomes more complicated. While the turbulence in the industry in terms of changing customer needs, consolidating new market channels and competing on low cost is easier to manage with in-house services, on the other hand, turbulence in the industry also means increased business risk, and risk-averse manufacturers may choose to operate mainly through service partners. There is, therefore, not a single vision on how industry turbulence influences organizational arrangements.

Of course, each organizational arrangement has its own challenges, among them we can identify for the *internal* one: large fixed costs, flexibility reduced, wide range of competences, etc.; for the *hybrid*: risk for competition with service partners, difficulty in changing the organizational arrangement without risk channel conflicts, etc.; for the *external*: uncertainty and potentially incongruent motives of manufacturing firm and service partners, lack of clarity on who "owns" the customer interface, etc.

Hybrid organizational arrangements seem to be the most plausible options. Finally, in contrast to the externalization of service provision, internalization requires significantly more resources and time and involves the potential risk of channel conflict.

2.3 Obstacles to servitization

Looking at the world of services is not that simple. Manufacturing companies, distributors and professional services companies have to deal with various obstacles. Among the most complex we can find the need to **overcome the product-centric mindset**, and in particular going beyond the concepts of: *sourcing supplies, leverage R&D for product innovation, manufacture goods and master the supply chain*. Indeed, services typically turn these factors upside down. They are hard to specify, produce, market and sell and the focus of attention shifts towards outcomes achieved. In order to overcome customers' concerns, companies need to persuasively demonstrate a service's value-creation potential.

It is also very important to **generate deeper customer insights**. Many firms still segment the market by products or industry application rather than using value-based segmentation or customers' willingness to pay for deeper insights. The **co-creation of services** together with the customer is another big challenge; we talk about active customer involvement when customers and suppliers jointly develop, integrate and roll out complex services, taking into account, for example, the definition and agreement upon key performance indicators. But controlling the customer is more difficult than controlling internal employees. Together with co-creation, another problem could be the lack of standardization that developing a service imply (completely in contrast with the standardization of product/process development).

Another obstacle is the **CAPEX logic**. Breaking it away, favouring an OPEX logic is a complex process (*Kowalkowski and Ulaga*, 2017). Sourcing logic is still deeply embed-

ded in a capital expenditure mindset. Suppliers need to street out the idea that customers can obtain advantages without investing in goods, industrial buildings, equipment or consumable. They can simply gain the right to use an equipment, rent a machine, obtain access to facilities only when needed.

Start improving the **control on the channel** is as important as the other points above, and this because services are not goods, they cannot be putted on a shelf and they mostly are performed locally.

Inevitably, there are cases where the increase in services is not matched by an increase in revenues. What happens is that costs increase, returns do not match and the growth in service revenue fails to meet its intended objectives. *Gebauer et al.* (2005) define this phenomenon as **service paradox**. The cases analysed by them showed that 35% of companies earn less than 10% from services. But like any strategy, managerial motivation and supporting organizational arrangements are necessary. Also, according to *Neely et al.* (2011), the company's organizational culture and abilities are essential for the realization of an effective service strategy. Factors such as willingness of rewards, efforts that brought to successful performances and rewards linked to performances, are useful to motivate managers to push on servitization. Of course, these factors are limited by numerous cognitive phenomena (e.g. overemphasizing obvious and tangible characteristics, do not understand the potential of extended service business, be extremely risk-averse).

Another barrier that may emerge is that of not being able to be market-oriented, nor being able to identify the needs of the market.

In order to sell services, employees must have the right mindset and be encouraged to better understand customer benefits from services.

Corporate culture, in fact, can make the difference for achieving service growth. Attitudes and behaviours of frontline employees profoundly affect a company’s top- and bottom-line results.

In the transition to services, many companies face another paradox: on the one hand, there is a strong manufacturing expertise and a product heritage that could support the development of value-added services, while on the other hand, this same knowledge can act as a barrier to the development of services.

2.3.1 Implementing servitization into companies

Three key concepts can be considered if you want to implement servitization in companies. Customer centricity, customer intimacy and customer orientation. The fundamental idea is to get out of the mental scheme of simply selling what the company produces and encouraging questions such as *"how customers judge value in making purchases?"* or *"what unique know-how the company possess that might help customers make better purchases?"* (*Kowalkowski and Ulaga*, 2017).

These key characteristics highlight what emerge from the differences between a product- and a service-centric firm. Authors such as Bowen, Galbraith and Shah have defined the main differences dividing them in different categories, from the **overall goal** ("move boxes" vs serve customers) to the **source of differentiation** (product quality and standardization of manufacturing processes vs customer experience and standardization of service processes), from the **interaction buyer-seller** (sales focused on closing deals vs sales focused on "growing the pie") to the **performance metrics** (portfolio of products vs portfolio of customers).

2.3.2 Resources and capabilities for servitization

Finally, there are certain resources and capabilities that are needed for the development of a service-growth strategy, and Kowalkowski and Ulaga define them in their book (*Service Strategy in Action*, 2017). First of all, managers must take stock of the situation on the key resources that the company already owns. From these resources a wide range of services can be developed.

Installed base product usage and process data. The IB represents an important strategic asset. When used strategically, access to data provides a significant advantage over both direct competitors and third parties such as pure-service players.

Product development and manufacturing assets. Product companies, usually, control unique resources linked to R&D, design and production processes. So, when other competitors lack such assets, suppliers can develop unique competitive advantages through differentiation and cost leadership.

Product sales force distribution network. A privileged access through direct and indirect sales organizations represent a unique resource that B2B companies can leverage on their advantage.

Field service organization. Field-service networks represent not only a key resource for effectively providing product lifecycle services but also an opportunity for venturing into new and more complex services such as asset efficiency or consulting services.

Service-related data processing and interpretation capability. Having access to customers' strategic product usage and process data derived from an installed base is only a first step. Manufacturers still must determine how to translate these data into a source of new revenues and or identify opportunities for providing existing services at lower costs.

Execution risk assessment and mitigation capability. Execution risk refers to uncertainty about whether contractually agreed-upon service outcomes will be achieved. The ability to assess and mitigate execution risk is critical, especially as it is not easy to balance the provision of services at competitive prices and achieve internal profit targets.

Design-to-service capability. An important challenge is how to develop a system and culture able to incorporate the opportunity for providing a service in a firm's innovation process. Product and service innovation must interact synergistically for value creation rather than in a merely additive manner (e.g. after-sales services).

Service deployment capability. Firms need to take a production-line approach to service operations in order to ensure that service costs don't outweigh revenues.

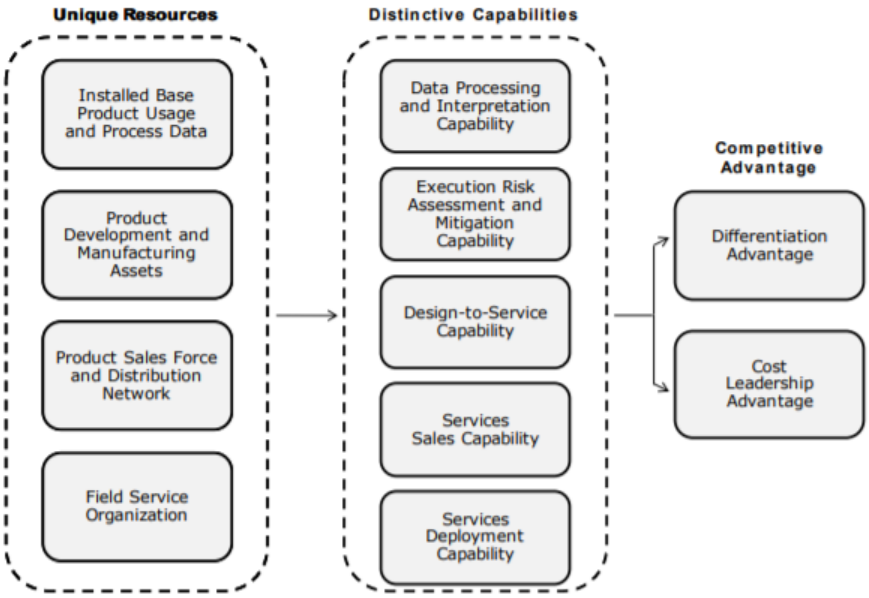


Figure 2.1 "Unique Resources and Distinctive Capabilities for Successful B2B Service Growth", Service Strategy in Action, page 86, Kowalkowski and Ulaga, (2017).

2.4 Different types of services

Kowalkowski and Ulaga (2017) have developed a **four-quadrant matrix** in which they categorise services into four distinct areas. The matrix is characterized by the variables *service recipient*, with which one wonders if the service is closely related to the product offered, and *nature of the value proposition*, which concerns the performance level input- or output based, where input-based means, for example, express delivery or sale of components, for which the customers are invoiced for time and material.

Most companies, at least, offer a basic set of core services. **PLS** facilitate the customer's access to the manufacturer's goods and ensure proper functioning during all the stages of its lifecycles (also pre- and after-sales).

PLS, usually, are perceived as "must have" from the clients, and this imply a low willingness to pay them. But at the same time, they cover the important role of building the vendor's reputation as a competent service provider. They are often given away for free, but managers should differentiate their offer by providing different levels of a PLS. With a standardization of PLS, vendors could also put a lower price for PLS respect to the ones of the competition.

AES are services a supplier provides to help customers achieve productivity gains from investments made into assets. This type of services includes predictive maintenance, on-site or remote condition monitoring, … As PLS, Asset Efficiency Services are still attached to a supplier's product but with a changing value proposition. To sell a successful AES, companies must be able to collect unique customer usage data and develop distinctive risk mitigation skills. Moreover, AES and PLS are not considered "must haves" but more "source of differentiation".

Firms can also develop their overall portfolio by growing into services directly geared toward their customer's processes. **PSS** are those services that a company supply to its customers in order to improve their own business processes. In this case, the value proposition focuses on leveraging the supplier's unique resources and distinctive competencies to help customers optimize their own processes or specific elements thereof. Process Support Services are usually tailored to customer-specific contexts and needs.

Finally, **PDS** are a combination of goods and activities that a supplier integrates in order to perform processes on behalf of customers. They are also referred to as customer solutions. Suppliers that offer Process Delegation Services take charge of and control the processes together with, or in behalf of, their customers.

Indeed, six aspects of PDS are considered:

1. Suppliers **integrate** goods and service elements into hybrid PDS
2. PDS are highly **customized** to address specific requirements
3. A high level of customer **involvement** is required
4. **Interests** of both parties are strongly **aligned**
5. **Supplier** has to **assume** some level of **risk**
6. With PDS, complex **gain-sharing agreements** are involved

These four elements can be reported in a table, as can be seen in Figure 2.2.

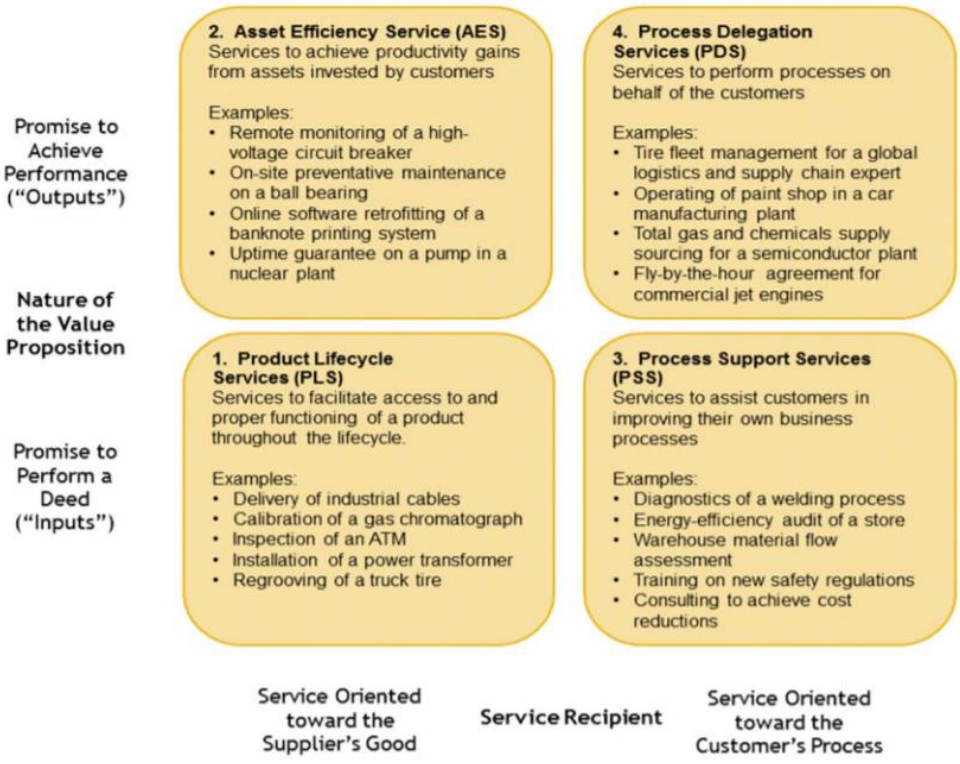


Figure 2.2 "The B2B Service Classification Framework", Service Strategy in Action, page 33 Kowalkowski and Ulaga, (2017).

2.4.1 Developing a service culture

Previously we talked about service culture, company culture, etc... Even now, almost superimposed, it is possible to build a four-boxes matrix in which to insert the different steps that a company can go through when trying to develop a service culture (Figure 2.3). Having service-growth ambitions means have to change the organizational route. But this is not an easy path, and, in particular, is very challenging for those service-myopic firms which are deeply entrenched in the manufacturing mindset.

The elements of the matrix are the following:

Service desert. Many service-myopic firms[12] find themselves stuck in what the authors call *service desert*. These companies consider services completely attached to goods and delivered just to enable product sales. Moreover, managers truly consider these, and only these, services as "must have". Beyond spare parts and repairs, remaining services are considered as profit drains.

Dark tunnel. Once firms start moving from this *service desert*, they are at risk of getting stuck in the *dark tunnel*, where companies start to rump up investments in service-specific infrastructure, new service offers and people. For example, acquiring smart technologies could venture into AES, or hiring consulting salespeople can grow the PSS. In this case, companies can face the service paradox, where you suffer from short-term losses in the face of a slow growth of services supported by significant investment and commitment. But managers have to understand that they need to build up a critical mass of service revenues first before reaping the benefits of a service-growth strategy.

Promising light. This step means overcoming the service paradox. Some lucky firms might not experience the *dark tunnel* at all, and with a "quick win" achieve initial promising results investing some effort. Of course, a "quick win" must translate into tangible revenues and demonstrate that the company could turn a profit.

Bright landscape. This is the final destination on this journey. In this phase companies allocate significant resources to infrastructures and people in order to serve customers. The service business is a unique profit centre, with revenues coming from a large mix of service offering that reach way beyond "must have" services.

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[12] *For further information on the characteristics of the so-called "service-myopic firms", please refer to the book Service Strategy in Action (Kowalkowski and Ulaga, 2017), on page 59.*

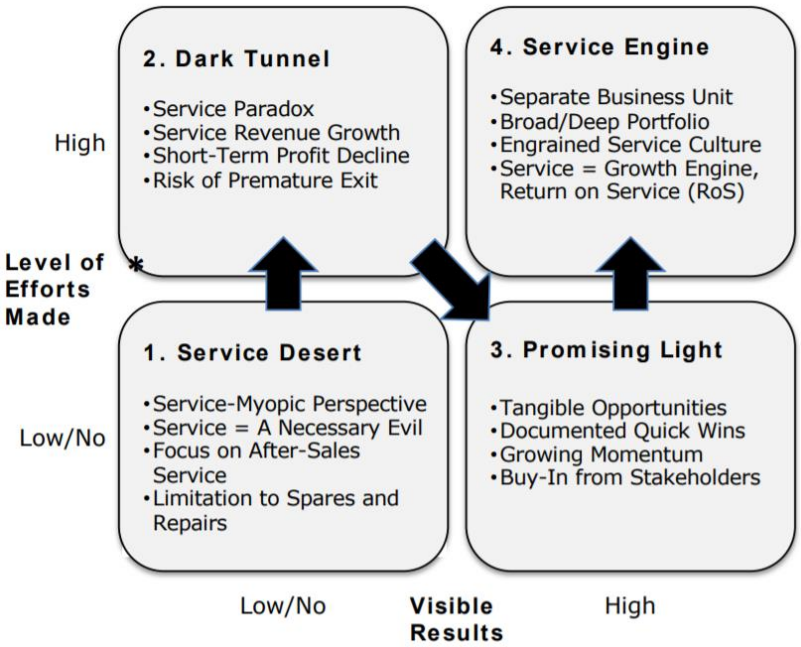

Figure 2.3 "Four Steps to Building a Service Culture and Growth", Service Strategy in Action, page 51, Kowalkowski and Ulaga, (2017).

2.5 Servitization, what is going on in Italy?

An example of Italian success in the field of servitization reported by *Industry4Business* (2018) is the one of the MCM company, which produces precision machining centres and has data collection systems based on IoT technologies capable of detecting the progress of a production activity of the installed base. Thanks to this real-time information, the company has provided its customers with production planning and scheduling services, as well as predictive management and maintenance.

The phenomenon of servitization favours the differentiation of supply, the creation of new competitive advantages and significant, continuous and anti-cyclical sources of profit. However, it is not an easy step because, as we already saw, servitization pushes companies to change and radically innovate their business model.

To understand if Italian companies are really ready for this change, *ASAP Service Management Forum* has carried out a survey to understand the level of servitization of manufacturing companies which responded to it (about one hundred European companies, 48 of which were Italian - 42% medium-sized, 32% large -).

Five key points have been highlighted:

1. The importance of services will certainly increase in the future, but most companies do not yet have a formalized path of service transformation. Less than 30% of re-

spondents say that their company has procedures that drive the development of new services. More than 60% of large companies, on the other hand, say they have developed a strategy to define what the new services and their objectives will be.

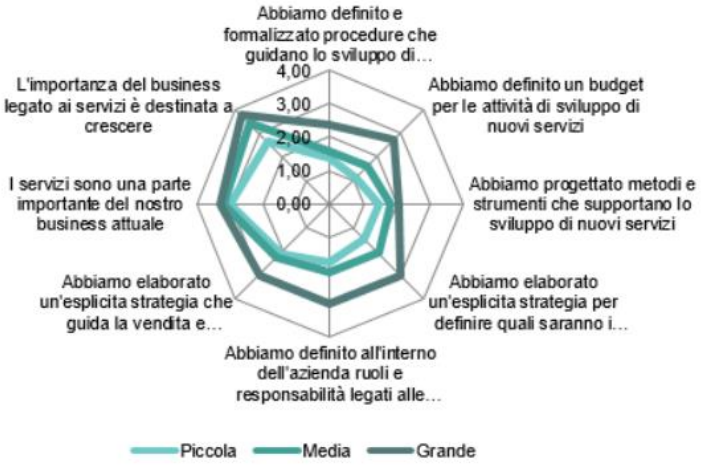

Figure 2.4 "Importance of the services business and strategies for developing new services" Servitization: a che punto sono le aziende italiane?, Adrodegari, Saccani, Industry4Business, October 2018.

2. To date, revenues are mainly generated by the sale of products (75%), while services cover 20% of them and concern spare parts and technical assistance. Renting and "*pay per use*" are practices that are almost absent.

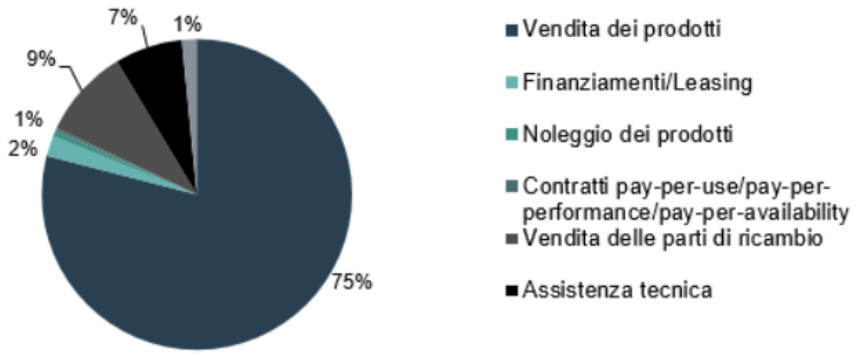

Figure 2.5 “Breakdown of turnover generated (average of the sample)” Servitization: a che punto sono le aziende italiane?, Adrodegari, Saccani, Industry4Business, October 2018.

3. In line with point 2, the companies have stated that they mainly offer basic services (documentation, repair, basic training). Among the most complex services, however, maintenance contracts and services aimed at optimizing production processes prevail. These are however offered on request. More advanced services such as remote diagnosis, warranty extension or maintenance contracts are only offered sporadically, regardless of the size of the company.

Figure 2.6 "Service portfolio development (0: not offered; 4: always offered)" Servitization: a che punto sono le aziende italiane?, Adrodegari, Saccani, Industry4Business, October 2018.

4. Customers are still very attached to the possession of the machinery. In fact, most customers do not understand the benefits of services and life-cycle costs, but rather, they rely on expected performance and purchase price, effectively hindering the development of *"pay-per-use"* contracts. Another problem that emerges is the fact that customers are reluctant to give access to their data to manufacturers.
5. The last point is linked to this theme, that of data collection and management. The information traditionally collected is that concerning the failure data, the operating hours or the activities carried out for the maintenance of the product. There are very few companies that collect and process real-time data and performance-related information.

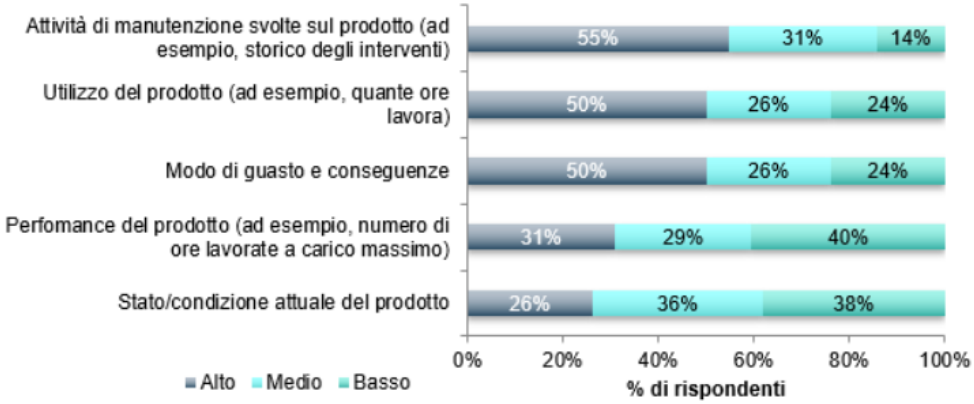

Figure 2.7 "Level of information collection on the installed fleet" Servitization: a che punto sono le aziende italiane?, Adrodegari, Saccani, Industry4Business, October 2018.

2.6 Conclusions

We can summarize this chapter by arguing that the phenomenon of servitization is increasingly playing central roles for companies, both B2B and B2C. This is due both to the fact that they try to follow technological advances, face customer pressures, and try to differentiate themselves in a world where products seen as "commodities" are increasing more and more. When we talk about servitization, moreover, we are not just talking about the transition from products to services, but about a more structural change, capable of involving the entire value chain and changing the relationships with suppliers and customers, moving from transactions to real relationships and creating networks in which external actors become partners. Logically, this phenomenon must be deeply accepted within the company and specific skills must be implemented within the latter in order to achieve relevant results. Authors such as Kowalkowski and Ulaga have in fact mentioned distinctive skills and unique resources. As just mentioned, the customer - through servitization - becomes the key figure.

Another topic that emerges is the internalization or externalization of the development of these services. Among the different studies there is not a single position but rather there are different points of view. The most difficult challenges for companies will be to overcome the product-centric mindset and the CAPEX logic.

We then saw that the types of services offered can change depending on two variables, the nature of the value proposition and the service recipient (i.e. the service could be embedded in the product or process of the customer).

Finally, as regards Italy, the data shows that companies are not yet fully able to embrace servitization. Especially small and medium companies are struggling (and this is normal if we think that servitization brings with it, most of the time, the remake of the revenue flow system, which can be difficult for many companies). However, there is a general awareness of the role that servitization will play in the near future.

RESHAPING THE BUSINESS MODEL

3.1 Introducing business models

The term "business model" rose to prominence only towards the end of the nineteens. To date, you can find different definitions of the concept of Business Model. Moreover, between 1998 and 2002, more than 10 different definitions were given, but none of them were really accepted by the business community, maybe due to emanation from different perspectives (i.e. strategy, e-business, technology, etc.) (*Shafer et al.*, 2005). Authors such as Osterwalder, Pigneur and Tucci, in order to try to find a definition, created a survey from which more than 50 different definitions emerged (out of a sample of 62 people of the Information System community). Of these definitions, just over half led to a value/customer-oriented approach, and 45% to a more activity/word-related approach.

The opinion of *Osterwalder et al.* (2005) is that authors writing about business models can be classified in three categories: those who describe the BM concept as an abstract overarching concept that can describe all real world businesses; those who create a classification scheme, each one describing a set of businesses with common characteristics; those who conceptualize a particular real world business model. But, again, *Osterwalder et al.*, (2005) do not limit themselves to this classification. Rather, they create a hierarchy of concepts, starting from meta-models that conceptualize definitions, passing through taxonomy, arriving at concreteness with instance level.

The authors theorize that the business model is a building plan that allows to realize the business structure and systems that constitute the operational and physical form the company will take. These elements are constantly subject to external pressures such as competition, social and technological changes, customer opinions and the legal envi-

ronment. They gave a definition of Business Model based on a synthesis of the literature and on their development of 9 blocks (*Osterwalder and Pigneur*, 2004) that covers all the components mentioned by at least two authors before them regarding the elements of a BM[13].

The **definition** is the following:

> "A Business Model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams" (Osterwalder and Pigneur, 2004).

Another relevant author regarding the study of business models is *Chesbrough* (2007), who has broken down the business models into 6 categories, starting from the simplest models and arriving at the most complex ones. In fact, we can distinguish companies with an undifferentiated business model, which probably sells commodities (competing on price and availability); companies with some differentiation in the business model, thus being able to serve a different market segment and less congested; companies with a segmented business model capable of serving different markets extracting profit (this kind of company is still sensitive to major technological changes or shifts in the market); companies with an externally aware business model, opening up to external ideas and technologies. These companies understand the usefulness of developing relationships with customers and suppliers and exchange internal roadmaps frequently. The other two most complex types are: companies that integrate their innovation process with their business model (which includes the entire value chain and with which, customers and suppliers, share their roadmaps); and finally, companies that have a business model that functions as an adaptive platform. The latter requires experimenting with different variables of the business model, with customers and suppliers becoming true partners of the company.

In this dissertation we will use the model proposed by Osterwalder, and whenever we refer to the "blocks of the business model", we will be referencing the Canvas Business

[13] *BM stands for Business Model.*

Model theorized by Osterwalder. The choice falls on it for the simple reason that it is the one most used and known in the business world. In addition, subsequent analyses in the case study will be based on papers that in turn used the Canvas of Osterwalder and Pigneur.

3.1.1 Business Model Canvas, a business design tool

In the book *Business Model Generation: a handbook for visionaries, game changers, and challengers,* (2010), the authors Osterwalder and Pigneur dedicate a whole section to the development of Business Model Canvas, a strategic Business Design tool that uses visual language to create and develop innovative, high-value business models. A Canvas essentially allows to represent, in a visual way, how the company creates, distributes and captures value for its customers. It is composed by 9 blocks in a lean template.

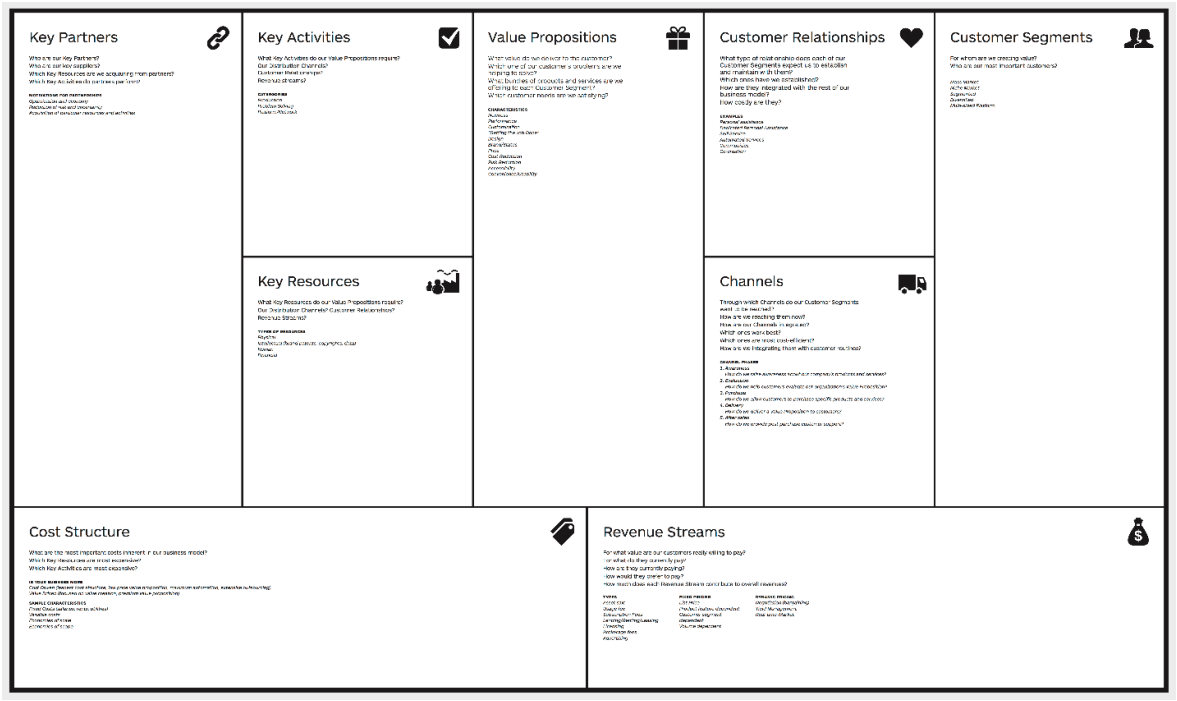

Figure 3.1 "The Business Model Canvas", Osterwalder, Pigneur & al., 2010. Source: www.businessmodelalchemist.com/tools .

Given the importance of this tool and its massive application in recent years to assess companies and the possibilities of implementing their underlying business models, it is worth investigating all 9 boxes with the characterizing elements within them[14].

[14] *From now on, for the whole sub-paragraph, we will always refer to Osterwalder and Pigneur (2010).*

The analysis shall start with the **customer segments** quadrant. It describes the different groups of people/organizations to which the company is addressed. This is very useful because it allows to build packages of products/services around the needs of each cluster of customers.
One way to segment customers is to divide them by needs, needs and behaviour. The markets in which they can be identified are: mass, niche, segmented, diversified or multi-sided markets.

In the centre of the template we find the **value proposition** block. The value proposition is that package of products and services that represents value for a specific customer segment. This answers the question "why should customers choose our product/service?". The business model depends heavily on this block, which makes the company stand out unambiguously. Not only the products and services offered should be considered, but also all those elements that are considered "valuable" by the customer (e.g. experience of use, innovation, accessibility, etc.).
To create a value proposition, you can consider different ways:

- To innovate
- Make a product/service accessible
- Improve it
- Lower the price
- Use the brand to convey identity
- Improve design or performance
- Make products easier to use
- Reduce risks

Focusing on the real and urgent needs of the customers is needed. Here too, the synergy between value proposition and customer needs, activities and desires must be found.

To the right we find the **channels** block. This describes how the company reaches a customer segment to introduce it and provide it with the value proposition. The channels are essentially the points of contact between the company and the customer and can be

- Direct

- Indirect

Channels create customer awareness about the product/service and the company itself. They help to evaluate the value proposition, offer the product/service and allow you to follow the customer in the after-sales.

Above the channels block we find the **customer relationships** box. This block describes the relationships you have with different customers, and in particular how the company acquires customers, retains them and increases their purchases. The types of relationships can be different and Osterwalder et al. qualify them in:

- Personal assistance
- Dedicated personal assistance
- Self-service
- Automatic services
- Community
- Co-creation.

Companies need to understand how they integrate the types of relationships with the business models they build.

In the lower part of the table we find the **revenue stream** and the cost structure. The first relates to the revenues that the company obtains by selling the products/services to a certain customer segment. The two key variables are price and payment methods. Typical flows can come from:

- Sale of an asset
- Usage fee
- Subscription fee
- Loan/rental
- Licenses
- Advertising

If you want to change business you have to ask yourself what customers have to pay for, how and how much they have to pay.

Then, the authors analyse the **key resources (and capabilities)** block. It contains the strategic assets (and capabilities) that the company must have in order to give life to and support the business model. Also in this case, each company is characterized by different key resources, which in principle can be categorized into

- Physical, material goods (points of sale, plant, machinery, etc.)
- Intellectual, such as company know-how, patents, trademarks, copyright, customer databases, projects developed, etc.
- Human, such as programmers for Facebook or designers for Ikea, for example
- Financial, that is all those resources (credit lines, cash, stock options, etc.) that allow the company to hire employees, guarantee supplies, etc.

It is therefore necessary to ask ourselves which are the strategic resources to create one's own proposal of value for a certain segment of customers.

On the top of the key resources block , we find the **key activities** block. This block essentially describes what strategic activities need to be performed to reach customers, maintain relationships, generate revenue and create and sustain the value proposition. Obviously, the activities vary according to the business model, but in general they can be of three types:

- Productive activities, typical of manufacturing companies (where you have to create, produce and distribute solutions)
- Problem solving activities, typical of companies that focus their value proposition on the proposal of services (e.g. consulting companies)
- Maintenance activities and / or development of platforms / networks (e.g. Google, Facebook)

This block, together with the block of key resources and key partners, will determine the cost structure that the company will have to bear.

In the top-left corner, we find the **key partners block**. This is where all the partners necessary for the functioning of the business model (e.g. suppliers, lead users, specific customers, consultants, etc.) are inserted. You can no longer think of the company as a self-sufficient entity, but it must be considered in the ecosystem in which it "lives".

There are, in fact, strategic external actors that help the company to fully implement the business model and, consequently, to increase the chances of success in the market. Key partners can help:

- Optimize resources and activities
- Develop economies of scale
- Reduce the risks of competition
- Increase the size of the market in which you operate
- Acquire resources and special activities (as well as knowledge)
- Spread the brand more widely
- Discover new customers

There are three types of partnerships that can be created:

- Strategic alliances between non-competing companies
- Strategic alliances between competitors
- Joint ventures

The fundamental point is to look for partners with whom to create synergies. Partnerships are becoming a cornerstone of many business models and they are useful in order to reduce risks, acquire resources or optimize the BM itself.

The **cost structure** comes almost directly from the structure of key activities, partners and key resources. The business model usually has:

- Fixed costs
- Variable costs
- Economies of scale
- Economies of scope

They can be described according to whether they are cost or value-driven models.

3.2 Business model innovation

Usually businesses face significant barriers to business model experimentation. One of them could be managers who resist to experiments that might threaten their ongoing value to the company. Authors such as *Amit and Zott* (2001) sustain that managers easily recognize which is the right business model, but there are resistances when they have to develop it, because of the conflicts that emerge about the prevailing business model or the asset which support it. *Chesbrough* (2010) has another opinion on the same subject. Managers do not know which the correct business model is to adopt and to overcome the problem they need to experiment. For example, they could undertake tests on possible nascent markets configuring in different ways the elements of a business model. Chesbrough underlines that these experiments alone are not enough.

The literature identified at least three different approaches to respond to the problems affecting traditional business models (*Ibarra et al.*, 2018). These are: the *service-oriented approach*, which brings to develop an optimal mix of product and service business, and with the Industry 4.0 pushes companies to a change of mindset; the *network-oriented approach*, that regards stakeholders and organization network. In this case, new actors arise, and the role of the existing ones change; the *user-driven approach*, which helps manufacturing companies to be more responsive in user-driven design and to align it better with customer value creation processes and context.

Beyond the categorization of the business model – as can be the one made by Osterwalder – according to authors such as *Foss and Saebi* (2018) it is important to develop "*clearly articulated research models that lay out the basic causal web connecting antecedent, moderating, and mediating variables*" with the BM and BM Innovation constructs. *Foss and Stieglitz* (2015) and *Foss and Saebi* (2017) define BMI[15] as

> "Designed, novel, and non-trivial changes to the key elements of a firm's business model and/or the architecture linking these elements".

They dimensionalize it in terms of novelty and scope and with regard to this, some scholars have different opinions about the extent of the scope (i.e. changing a single component of the BM is enough or two or more changes in components are needed in order to talk about Business Model Innovation?). A different line of thought is carried

[15] *Business Model Innovation*

out by *Schneider and Spieth* (2013) according to which we talk about Business Model Innovation as a reaction to a change in value creation sources and therefore focus on the company's external environment, instead, Business Model developments are internal-oriented.

Foss and Saebi (2017), again, divide the BMI into four different categories considering the two variables *novelty* and *scope*: *evolutionary BMI*, which refers to changes that happen to individual components of the BM over time; *adaptive BMI*, that "involves changes in the overall business that are new to the firm, but necessarily not new to the industry"; *focus BMI*, that means innovating within one area of the business model; *complex BMI*, which affects the business model in its entirety and has the potential to disrupt established industries.

But it is not so common that completely new business models work well the first time around. In fact, decision makers could face difficulties in both, the exploratory and the implementation stages. They may deal with organizational inertia and different lock-in effects linked to the existing business model design.

In the extreme case that new competitors, strategic innovators, have to be rejected, or an important market share (vital for long-term livelihood) has to be captured, it may be necessary to cannibalize the existing business model to introduce a completely new one capable of responding to those needs (*Velu and Stiles*, 2013). A company can therefore seek long-term success by innovating its business model, but the uncertainty of its feasibility suggests that a trial-and-error approach is the most appropriate, even considering its conceptualization and implementation.

Past choices and experiences of companies, intrinsic to routines and beliefs, also influence future choices and adaptation to the external environment. However, this one is changing and therefore the perceptions of managers can be ambiguous. In addition, over time, the external environment itself can change and shape responses and routines of the company. Inevitably, trial-and-error experimentation and organizational search are two mechanisms for modifying routines and beliefs (*Sosna et al*., 2010).

In most cases, established firms initiate a process of experimentation as a reaction to difficulties. Moreover, in order to obtain approval from external and internal stakeholders, a limited number of resources are used compared to the ongoing business to approach the experimentation.

3.2.1 IoT and business models

Before talking about the relationship between IoT and BM, it is necessary to introduce the concept of Internet of Things. The term was coined by Kevin Ashton, of P&G, in 1998 referring to the fact that all the objects around us can be connected to the network and that there is the possibility for anyone to access it anywhere (Westerlund et al., 2014). Specifically,

> "The IOT describes the interconnection of objects or "things" for various purposes including identification, communication, sensing, and data collection." (*Oriwoh et al.*, 2013).

Moreover, an IoT ecosystem is the set of all the components that enable businesses, governments, and consumers to connect to their IoT devices. The ecosystem includes remotes, dashboards, networks, gateways, analytics, data storage, and security (ETMA – Enterprise Technology Management Association). According to *Westerlund et al*. (2014), for IoT ecosystems, there are four areas of value in Business Models, drivers, nodes, exchanges and extraction dynamics. Value creation and value capture based on an IoT ecosystem makes it necessary to innovate the business model through specific mindsets. These are closely linked to the new nature of the products, which should be able to predict and anticipate customer needs. The new mindset needed, on which the IoT is based, also requires the ability to understand the importance of partnerships. With IoT business models, the elements within the blocks of the BM change. This is how, for example, key partners in these cases become software developers, hardware developers, data integration, launching customers, distributors and service partners. In the key resources you can find, in addition to physical, intellectual and financial resources, also software. The same value proposition is implemented, like customer relationships, where co-creation certainly becomes a very important element. The costs of IT, the development of new hardware and software also are important. The revenue model (described in sub-paragraph 3.1.1) itself is changing, developing subscription systems, licenses, advertising fees that in some sectors of the B2B world could seem unthinkable. The IoT platforms themselves can be considered as "novel business models" (*Ustundag and Cevikcan*, 2018). One of these is the Microsoft's platform, which is able to offer a wide range of solutions to connect, analyse and optimize the use of industrial equipment and devices.

An interesting classification of business model based on IoT is that made by *Guo et al.* (2017). The authors distinguish BMs as novelty-centred, focused on creating new markets, services and innovation; efficiency-centred, with the aim of increasing the efficiency of transactions; lock-in-centred, with the aim of increasing the volume of transactions and increasing customer loyalty through customization, reliability and increased security; and, finally, complementary IoT business models, with which they seek to provide additional products/services that are more valuable together.

In any case, beyond the different classifications, IoT is playing a key role in companies, and in the coming years companies will increasingly be able to capture value from the data generated by the IoT elements. The data ecosystem itself is playing a key role in defining the future competitive scenarios of many B2B companies. The amount of data generated by the installed bases of B2B companies will increase dramatically over the years. The capabilities embedded in these smart and connected products which generate data could be divided into 4 categories: monitoring (conditions, operations, environment, with the aim of generate alerts and actionable intelligence), controlling (through software built into those products), optimizing (performance, remote services and repairs) and automizing (creating algorithms to let the product perform autonomously) (*Boston Consulting Group,* 2019*)*.

Smart and connected products are an integrated part of the IoT world. A major challenge facing organizations when developing their business models based on IoT and the smart and connected elements is to maintain a certain standardization in keeping the different devices connected while maintaining information security. Probably, business models can be tools to overcome these difficulties.

Usually new entrants, tech or native digital companies, are those who offer solutions and services using IoT data. Recently, however, many industrial companies (such as Honeywell or Siemens) have begun to make their way by offering services derived from the bases of dates from their more traditional businesses. This creates partnerships to offer services and discover new opportunities in adjacent markets. The most common partnerships are with analytics providers, digital-platform providers, data brokers, connectivity providers and all those system integrators that cover the entire data value chain.

There are some factors that, while not ensuring success, help companies considerably against the incumbents (*BCG*, 2019). As you can see from Figure 3.2, among these we find:

- access to real-time data coming from their installed bases
- access to historical data leading to the development of machine-learning and preventive maintenance
- the increase in relations with the end customer, as well as greater proximity to the same
- the use of the product not only as a simple component but as a product that operates at the level of equipment or plant
- the ability to "close the loop" having a direct impact on customer operations

Figure 3.2 "Five Structural Advantages Define the Right to Win in IoT", The Incumbent's Advantage in the Internet of Things, Russo M. and Wang G., August 2019. Source: BCG Analysis.

Different Business Models and different strategies could have different revenue models. The BCG has divided them into three categories:

1. **Augment core product revenues**. A route by which you can monetize new or retrofitting products with embedded sensors, microprocessors and connectivity, and with the possibility to have access to some data and control it by remote. If this type of IoT product is bundled with services, there are chances to capture aftermarket opportunities (maintenance and spare parts). Moreover, companies could move away

from the "one-time" sale and focusing on "charging per use". Here, the main problem could be the fact that before these changes, customers were used to receive some sort of service for free.

2. **Monetize data directly by building IoT solutions**. This is a potentially more lucrative path but also more elusive. Different models are emerging, such as building and selling industry-specific IoT platforms. Another model is building new service business to help customers implement and monitor IoT solutions. Companies can also collect and re-sell IoT data or analyse and provide new market insights.

   For this type of model, it could be necessary to reach new customer bases more distant from the core ones. In this case, it could be better to create an entirely new entity with a focus on commercializing new market opportunities.
3. **Orchestrate and monetize an IoT ecosystem**. This is the most advanced opportunity and the one with the largest addressable market. This is due to the fact that companies need (or will need) a platform and a set of standards to facilitate the collaboration of ecosystem participants. These types of platforms bring with themselves different monetization models such as freemium access, revenue sharing, charging access fees, etc.

The opinion of BCG is that, even if IoT is still in its infancy, competitive dynamics for monetizing data are already taking shape.

3.2.2 Business model and IIoT

Many manufacturing companies have to interface daily with new opportunities to work with a large amount of data. They often struggle to develop IIoT-based business models (*Westerman et al.*, 2014). But the IIoT itself can be a driver for new business opportunities. IIoT is defined as the set of Internet-connected equipment and advanced analysis platforms that process the data produced. IIoT devices range from small sensors to industrial robots. The IIoT is simply a subcategory of the IoT and can generate operational efficiencies and offer new business models (*Hewlett Packard Enterprise*). Approaches to IIoT-based business models may vary by company, in particular they are influenced by specific value creation, value delivery and value capture. Value creation can be more traditional, network-based, or customer-oriented. A very important element is the idea that the company has about its business partners. On the other hand, value de-

livery could be either value perspective, or a design of value exchange processes. Finally, the value-capture can have a revenues or costs perspective (*Laudien and Daxbock*, 2016).

Using IIoT-related technologies can help to connect the value creation process with that of the network partners, so it is possible to move from a traditional value chain logic to a value network logic. In doing so, you also need to change your business model. An example of what the IIoT does that could have consequences on the BM is to connect companies in the network and provide real-time information on production, processes, sales, availability, etc. Certainly, the process of value creation is influenced by the possibility of accessing data and the company's value proposition may change depending on the availability of digital services.

The full potential of IIoT products can only be adequately exploited if a process of business model innovation takes place (*Laudien and Daxbock*, 2016). The biggest advantage of an IIoT-based business model is that it can access customer usage data. This gives the ability to better understand what the customers' needs are and how they create value for themselves. By leveraging this knowledge, the company can concentrate and develop innovative solutions suitable for the customer, capable of distinguishing itself from its competitors and improving the value proposition.

An important topic emphasized by *Laudien and Daxbock* (2016) is what concerns the payment of digital services. Usually customers are not used to paying high amounts to receive digital services seen as add-ons. In addition, this type of service is only available if the customer gives the possibility to interact with their usage data. What can happen is that the customer "exchanges" this data to receive digital services in return, instead of paying for them.

Laudien and Daxbock's study also shows that many companies that adopt large-scale IIoT-based business models keep them separate from the traditional business model.

3.2.3 Practical examples

A very interesting approach, which will be followed in this research, is the one adopted by several authors such as *Dijkman et al.* (2015), *Arnold et al.* (2016) and *Metallo et al.* (2018). The authors analyse, through interviews and questionnaires, what are the essential factors of a Business Model in companies influenced by IoT and IIoT. They all start

from the basis laid down by the Business Model Canvas of *Osterwalder and Pigneur* (2010) and from those they make the necessary changes and come to the conclusions of their cases (based on the type of companies in their samples). For example, Metallo et al. pointed out that for IoT companies (like Intel) infrastructure management and product are the most important areas in a business model, while customer interface and financial aspects are less critical.

Arnold et al.'s study is based on the question "How does IIoT affect established business models of manufacturing companies in different industry sectors?" What emerges from their study is that machine and plant engineering companies are tending to change the qualification of their workforce, while electrical engineering and ICT manufacturers are implementing their network of partners. Suppliers in the automotive industry leverage IIoT developments through cost efficiencies. Moreover, a relevant role is played by data management and data mining in detecting patterns and transforming big data into valuable knowledge, helping the decision-making automatization. Manufacturing companies face new core competences (e.g. data analysis) and the roles of employees change from operators to controllers or problem solvers; when these competences are not available in the company, the manufacturer could search outside, involving partner networks. At the same time, customers are becoming more and more important in order to collaborate, develop, design and engineer IoT products and solutions.

Dijkman et al. (2015) have also analysed the importance of the blocks in the business model of IoT companies. From the study has emerged that *value proposition* is the main block. *Customer relationships* and *key partners* are also considered to be very important.

3.3 Duality in business models

Studies have shown that competitive pressure has pushed business model innovation to the CEOs' priorities. *Velu and Stiles* (2013) describe how a company can change its business model in a successful way and run two such models simultaneously, with the intention of one cannibalizing the other. Managing two business models is clearly not easy, so, failing in this and directly changing the existing one could be problematic and dangerous. There is not a single view of the phenomenon among different scholars.

There are those who believe that you can run a single business model, such as *Magretta*, (2002), or *Teece,* (2010) and those, instead, that you can manage two in parallel (including *Casadeus-Masnell and Tarzijan*, 2012, or *Markides and Oyon*, 2010). The latter, however, do not explain what the conditions are for this to happen. The most difficult challenge for managers is to understand how to manage the process of cannibalizing one business model over the other. Cannibalization is the moment when a new proposal is adopted (in the form of a new product/service/business model) and the value of assets already present in the company and the organizational routines are reduced (*Velu and Stiles,* 2013). One barrier to BM Innovation could emerges whenever firms are not able to reconfigure their assets to support the new business model due to the conflicts with the existing one. The barrier is both economic and cognitive. "Economic" because, usually, companies don't want to reduce the value of a profitable existing business. "Cognitive" because the business model is a cognitive conception and so, managers have to hold two different conceptions of the world simultaneously.
A willingness to cannibalize can be seen as a desirable trait that can promote business model innovation (*Velu and Stiles*, 2013). Rather than one business model offsetting the other, one view holds that combining two seemingly conflicting business approaches promises to yield rich benefits in terms of innovation.

According to *Velu and Stiles* (2013), to arrive to a disruptive business model innovation, companies need to go through a timeline consisting of several phases.

- *Intelligence phase.* In which senior management identify problems and possible opportunities
- *Design phase.* In which senior management develops alternative solutions to promote business model innovation
- *Choice phase.* In which senior management chooses between different alternatives

Trying to innovate a new business model in a company that maybe during the years has applied only small changes (and in this case we are talking only about the development of the business model), is not a simple thing. Just think about the elements within a business model canvas and how they could change when the company wants to try to explore new businesses. The possibility that the more traditional ones go against the

new ones you want to adopt is high. For this reason, we can talk about duality in the business models, and in particular the concept of ambidexterity emerges. Extracting the concept, we can define ambidexterity as the ability to manage and exploit one's own business - until now carried on – and, at the same time, explore new business models. This can happen either through an internal push, thanks to which the company discovers, for example, the possibility of entering new markets, or through necessity/response to the external environment. In the latter case, the company may have realized that what it is doing is becoming more and more a commodity and therefore it is necessary to look for new solutions to implement its business, or because it has realized that competitors are already expanding into other markets.
And today these events are typical, especially in B2B companies that are dealing with IoT or IIoT solutions and can already see how many possibilities are opening up.

Within the ambidexterity panorama, several studies have obviously been developed concerning different scenarios in which these theories are established. We can make a summary of at least a small part of the literature, and then, focus on those papers most important for the dissertation, which have also had an application in the active research.
Some authors focused on the study of ambidexterity in small and medium enterprises. Among these, *Lubatkin et al*. (2006), argue that SMEs struggle to be ambidextrous in a competitive landscape. This is because, unlike large companies, there is a lack of slack resources (i.e. those resources available to the company, but which become necessary only in times of "crisis", *Bourgeois and Singh*, 1983) and a structured hierarchical administrative system. Trying an ambidextrous approach, therefore, could lead to mediocre results both in the "explorative" and "exploitative" fields.
At the same time, SMEs are more affected by market changes and, as a result, operational managers are the first to feel the need to seek new resources for competitive advantage. In a large enterprise, however, the intermediate steps increase. For example, information that starts from the operating manager, must pass from the line of middle managers, then get to the seniors, and in this time frame the message is synthesized and filtered.
Another problem that may emerge is that of the Top Management Team (TMT), which, if little integrated, struggles to grasp, address and adapt to external challenges.

If then, the same TMT is integrated at a behavioural level, then it will be easier to manage the contradictory knowledge processes and make better use of the knowledge alternatives that they bring in the field.

De Clerq (2013) develops the concept of contextual ambidexterity in SMEs. The author formulates two fundamental hypotheses. The first is that the relationship between SMEs' performance and the contextual ambidexterity is influenced by internal rivalry, i.e. the extent to which individual managers perceive their peers as competitors for company resources, including tangible resources, such as financial or human capital, and intangible resources, such as the attention of key company decision-makers. Obviously, the higher the rivalry, the lower the performance.

The second hypothesis is that corporate performance and the contextual ambidexterity are influenced by external rivalry. This, differently from the first, is the one that forces managers to mobilize, sharing internally their own knowledge, as well as apply the knowledge of other colleagues, to reject external threats.

Another equally interesting point of view concerns the duality of business models managed at the level of value chain activities. In this case, the separation takes place at the domain level (i.e. separation of a discrete field of activity in resolving such dualities), (*Winterhalter et al*., 2015). Companies can therefore separate individual value chain activities to explore new business models and, while doing so, keep other activities integrated to exploit synergies. In addition, the separation of some domains may give the possibility to extend the reach of their original premium business model to catch new customer segments.

An example of domain separation may be that of some Western companies that separate production from their premium business model, transferring it to low-cost countries. In some cases, R&D is also shifted to emerging markets in order to better design products for use in resource-constrained environments.

In these cases, therefore, the line of separation does not go along different business units, but just along the value chain, across organizational units.

According to *Markides and Charitou* (2004), there are 4 strategies to manage dual business models (Figure 3.3). These strategies depend on two key variables, the first concerns how much the conflicts between the two businesses are serious, the second refers to how similar the markets in which the two business models result are. If there are seri-

ous conflicts of nature between the established and innovative business models and the markets of the two BMs are completely different, then a separation strategy should be adopted.

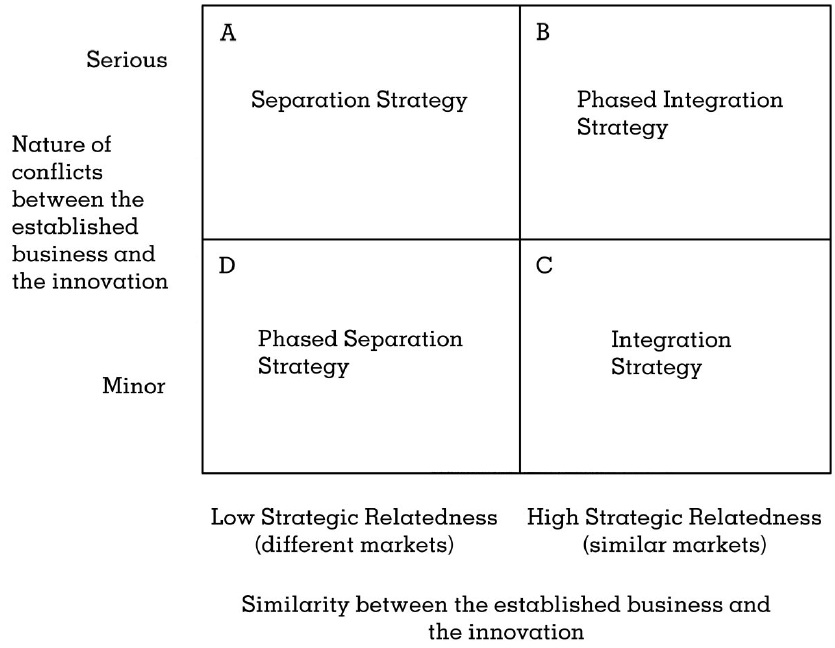

Figure 3.3 "Different Strategies for Managing Dual Business Models", Competing with Dual Business Models, a Contigency Approach. Markides & Charitou, 2004.

The determinants of the success of this strategy are: the high degree of autonomy that a new unit has in making financial and operational decisions, the high differentiation in budgeting and investment policies for the new unit, the inclusion of an internal CEO in the company, letting develop its culture in the new unit.

On the contrary, if the nature of the two BMs is not in conflict at all and there is no market difference, it is possible to integrate the new business model with the traditional one. In this case, the determinants of successful integration are: consider the new BM as an opportunity to grow, take advantage of the strengths of traditional business and find ways to differentiate, approach tasks in a proactive and strategic way, be careful not to stifle the new business model with existing policies. A difficulty that may emerge if you want to integrate the new business model is to operate in a very dynamic environment in which much differentiation is required. Working in more stable environments, on the other hand, facilitates the process.

A more mixed scenario occurs when the market is strategically similar, but the new and old business models face serious conflicts. In this case it would be better to separate the

two BMs for a while and then merge them slowly to minimize the disruption from the conflicts.

The last scenario occurs when the strategic market is different but there are no conflicts between the two BMs. In this case, however, it may be better not to separate immediately, but rather to build the new business in the company so as to exploit the assets and experiences already existing, and in a second step make the business independent.

In any case, deciding whether to separate or integrate the new business model is only part of the solution. If the chosen strategy is to separate, the company must still find a way to exploit the strengths in the new unit, without however constraining it. Similarly, if you decide to integrate, the company must still strive to protect the new business model without interfering too much.

In addition to separation and integration, as well as their intermediate stages, there is another method to develop ambidexterity in the company, contextual ambidexterity (*Birkinshaw and Gibson*, 2004; then summarized also by *Markides*, 2013). The organizational context thus takes on a certain importance, especially if you want to bring out certain behaviours so that the company can maintain its traditional business model and simultaneously develop a new successful business model. *O'Reilly and Tushman* (2004, 2011) also focus on the same topic.

The concept of contextual ambidexterity is seen as a mechanism to reconcile conflicting demands and goes against what is called structural ambidexterity. Using other words, it could be defined as the collective orientation to the simultaneous search between alignment and adaptability (*Birkinshaw and Gibson*, 2004). Essentially, what this theory requires is that there is a certain distance between the two business models, so that one does not suffocate the other, but at the same time the two must remain close enough to exploit synergies. All of this can be translated into practical terms by, for example, developing shared values, making common conferences and rituals and transferring people across the units.

The organizational context can be defined as the set of culture, values, structures, processes and corporate incentives (*Birkinshaw and Gibson*, 2004). Within the same, two factors are very important: performance management and social support. The first one regards the stimulation of people in order to deliver high-quality results and the development of the concept that people are accountable for their actions. The social support

variable, on the other hand, concerns the provision of security and the provision of the necessary space to perform. To measure these two factors, questions can be asked to people in the company, questions that refer to their managers.

Individuals and their level of ambidexterity are also relevant to the overall level of the company and its success (*Raisch*, 2009). In particular, the networks that are created (both internal and external) can be relevant to contribute to innovative activities for obtaining high levels of knowledge exploration and exploitation for innovation (*Agostini et al*., 2017). Exchange of internal knowledge is a useful practice for gathering and sharing knowledge in the company. This practice helps to bring people with different experiences and skills to solve problems together, acquire new perspectives, generate new powerful ideas and products. This kind of integrative efforts promotes the knowledge flows between spatially separated units. A company culture that promotes knowledge-sharing influences positively the emergence of innovation exploration and exploitation (*Lin and McDonough*, 2011). Giving a certain degree of decision-making autonomy can make employees more likely to share their knowledge with each other, with the aim of achieving higher levels of performance.

We can conclude the chapter with a reference to a concept that is developed in parallel with the organizational ambidexterity, i.e. the organizational vacillation (*Boumgarden et al.*, 2012). The organizational ambidexterity is questioned about the fact that, although exploration and exploitation can work in a complementary way to generate high performance, the organizational choices and structures that produce them highlight negative externalities that adversely affect the simultaneous delivery of both. To overcome this paradox either exploration and exploitation are balanced by creating hybrid or dual organizational structures in which the integrative efforts of top-level managers are essential, or the so-called organizational vacillation can be adopted. This theory suggest that high levels of performance can be achieved by alternating temporally and sequentially organizational structures that promote exploitation and organizational structures that promote exploration, even if the balance is not homogeneous (*Boumgarden et al*. 2012). This is a more dynamic approach, which should allow high performance to be achieved through both high exploitation and high exploration.

THE CASE OF AN ITALIAN MANUFACTURING COMPANY

4.1 Introduction to Alpha and the research

The focus of the dissertation is on the active research, which has begun with an internship at *Alpha*[16] in June 2019.

Alpha was founded in Padua in the 1950's as a company operating in precision mechanics. Between the mid-sixties and the second half of the nineties, it expanded internationally, opening subsidiaries and, between the nineties and the first ten years of 2000, it acquired some companies in Europe. At the same time, in 2009 the Beta project was born as a start-up. To date, the company has over 2000 employees, of which almost 45% in Italy and the remaining 55% in European countries and the rest of the world.

The company supplies elements for boilers, water heaters, fireplaces, gas/pellet stoves, ovens, extractor hoods, etc.

Alpha is the world leader in the production of multifunctional safety and regulation valves for gas, it is also the main European player in the market of non-captive electronic controls. It offers not only mechanical controls such as gas valves, pilot burners or sensors, but also electronic controls such as boards, remote controls and user interfaces.

Inevitably, Alpha is looking to emerging technologies that complement its core products. The main ones are heat recovery units, heat pumps, hybrid boilers, advanced user interfaces and connectivity.

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[16] *In order to respect the company policy and for the relevance of the issues dealt with, the name of the company will not be mentioned.*

The company's presence is almost global:

Figure 4.1 "Alpha's Global Presence". Source: company presentation, 2019.

Alpha serves over 1000 customers, including major international brands operating in both B2B and B2C such as Ariston, DeLonghi, Electrolux, Riello, Smeg, Bosch, Miele and LG.

From the very beginning of my internship, I had the opportunity to meet different people in the company who held different roles. The project began with a meeting on June 5, 2019, attended by the head of Digital Transformation, the dissertation supervisor, the president and an engineer of the American subsidiary, Alpha USA, and the company's CEO.

The topics that emerged from the meeting mainly concerned the idea of developing a small case study so as to analyse the requests of customers regarding smart-fireplaces - which the American team considers a very important market and on which it is possible to maintain an important share -, an analysis of the market itself, trends and innovations, research on competitors and on what they are doing at the moment and so on.

The market analysis, the research, the various meetings and the monthly calls made with the American team allowed me to better understand the industry, the opportunities and the path that the company itself is facing. To get an overview of the company, then, a

Canvas Business Model with the main and specific characteristics of the company has been created.

<table>
<tr>
<td>KEY PARTNERS

• OEM (as customer of product and services)
• Suppliers (due to the importance of high qualitative inputs)
• Distributors</td>
<td>KEY ACTIVITIES

• Quality Management
• Production
• Customization of products
• Customer Care
• R&D

KEY RESOURCES

• Skilled production workers
• Key Account Management
• R&D department</td>
<td>VALUE PROPOSITION

• Guarantee products of the highest reliability and quality to invest in innovation, product development and customer proximity to create added value</td>
<td>CUSTOMER RELATIONSHIPS

• Personal Assistance
• Post-sale Assistance
• Co-development with lead customers
• High focus on customer care

CHANNELS

• Direct Channel
• Indirect Channel
• Field Sales Representative</td>
<td>CUSTOMER SEGMENTS

• OEM
• Installers
• Distributors</td>
</tr>
<tr>
<td colspan="3">COST STRUCTURE

• Raw/semi-finished/finished materials
• Aftersales services
• Personnel Expenses
• Financial Income</td>
<td colspan="2">REVENUE STREAM

• Product Sales
• Spare Parts</td>
</tr>
</table>

Figure 4.2 "Alpha's Canvas Business Model", own elaboration.

In particular, the key partners have always been the OEM customers (with whom they carry out collaborations to develop products that are required by the market), suppliers (with whom over time has created a close relationship) and distributors (which for Alpha are not many). The key activities certainly concern the production and, in part, also the customization of some products, customer service (which is very much felt in the company) and research and development (in which, every year, important investments are made). Among the key resources we find know-how and human capital, key account managers (who have a key role with large OEM customers) and, of course, the R&D department. The value proposition of Alpha, to date, is to be able to offer its customers quality and safe products, as well as establish a relationship of development and proximity to the customer. Personal and post-sale assistance, as well as product development together with lead-customers, certainly emerge in the customer relationship. Alpha sells its products mainly through a direct channel and through distributors. These, together

with OEMs and installers, are part of the customer segments. In terms of revenues and costs, Alpha mainly relies on the sale of its products, and only partly on spare parts. At the same time, the largest costs are for material acquisition, after-sales service and personnel.

The study done during the internship, in conjunction with the writing of the dissertation, has allowed to bring out some very important issues for Alpha, in particular it emerged that in North America there is a strong demand for IoT technologies, and this applies not only to people meant as "end customers", but the same intermediate companies (in the case of Alpha, OEM customers) want SMART solutions to offer their customers and allow them to stand out, in a market that is very large and competitive.
This applies to both markets in which Alpha is a leader, that of boilers and that of gas fireplaces. In particular, given that the first part of the research covered precisely the latter sector, it is possible to make a brief reference to the study done, so as to explain why the IoT and, in a sense, the servitization, are two key topics for a company like Alpha.
An element like a fireplace becomes a real "must have" in American homes, and this, not so much for its characteristics as a heating element, but, most of the time, for its aesthetic function, as can be seen from Figure 4.3 ("Survey of Hearth Products in U.S. Homes", Siap et al., 2017).

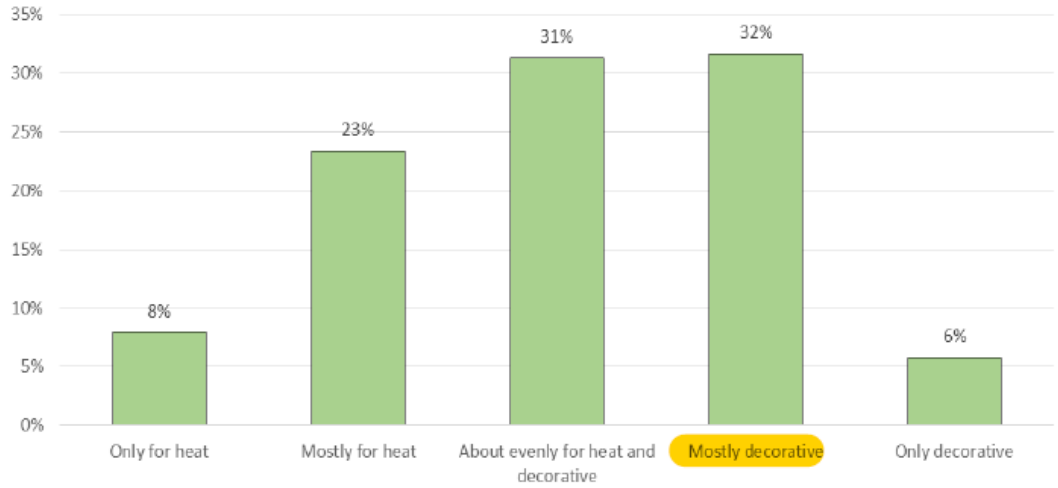

Figure 4.3 "Hearth Product Heating and Decorative Utility", Survey of Hearth Products in U.S. Homes, Siap et al., 2017.

A product like a gas fireplace, which may seem simple and without too much technology inside, is instead a concentrate of elements that today fall completely within the scope of the IoT, of which we see application in different sectors, from the automotive to the "Smart Home" sector. Nowadays, the customers themselves are those who demand that what the market is offering need to be something that can be controlled by smartphones, or that they can connect to "smart hubs" such as Alexa or Google Home. Manufacturers are responding well to these requests about adding features to gas fireplaces. Due to this, sales are growing and, in particular, the higher-end models ("Clean Faces", Home&Hearth Magazine, *Bill Sendelback*, July 2019).

The most important IoT and smart features that Alpha itself is implementing to remain market leader and, therefore, keep its customers loyal to it, concern the implementation of smartphone apps with remote control and user friendly interfaces, voice control connectable to the smart hubs mentioned above (i.e. Alexa or Google Home), the ability to connect to smart thermostats (which, in turn, are connected to the Internet and manageable remotely).

All these are big innovations for a B2B manufacturing company, but they are necessary for two reasons: the first is that the elements it produces for the producers of - for example - boilers or fireplaces, are becoming more and more commodities and therefore big Asian brands are able to offer similar products but at lower prices (conclusions obtained through some company meetings). It is, therefore, inevitable that the company seeks to stand out by offering new solutions capable of giving its customers an extra value that those companies cannot offer. The second reason is that this "Smart" evolution of this kind of products is also carried out by other companies (both American and European), which, for the same reasons as Alpha, are investing in IoT.

It's necessary that the company, in addition to these developments that concern the product and only partially the service offered, implements new solutions that distinguish it in the environment in which it is located and that bind it closely to customers. The concept of servitization therefore "comes in". Thinking about the theories mentioned in the previous chapters, it is easy to refer to what could be the solutions for Alpha (solutions that the company has already started to apply, and that in the 2020-2024 front will become increasingly important). First of all, they are thinking of offering customers the

possibility to perform remote monitoring (and in the future, predictive maintenance), as well as offering solutions that allow them to locate where their products are installed and how – and how much – they are used.
These are just few solutions that one may take into consideration and that fit perfectly into what is the servitization topic.

All these elements, studied during the researches carried out, concern the macro themes of chapters 1, 2 and 3, in particular:

- The IoT and the Industry 4.0 that allows its implementation
- The servitization and future scenarios that lie ahead for Alpha and, consequently
- The business model that could be innovated and renewed

Moreover, they led to the development of the following paragraphs, and in particular they led me to implement the questionnaires used for the company analysis. In addition, this market research and analysis activity can serve as a starting point for further and more in-depth studies and as a pilot-case study to be extended to other product categories.

4.2 Introduction to the surveys

In chapter 3 we discussed in depth the business models, what they are, which are the models from which we get more inspiration and who are the authors who speak more about it. The various subchapters then highlighted the value of IoT and IIoT in business models, as well as the meaning of dual business models. Alpha, from the beginning of 2019, has begun a phase of profound transformation, dictated both by the logic of internal renewal that they want to carry out, and by the fact that, to remain competitive in all its different markets and, at the same time, continue to expand, must inevitably face big investments on several fronts, in particular, product innovation, process innovation and human resources implementation (in terms of capabilities and know-how). To achieve these objectives, they are investing on their plants, their platforms, their IT systems, etc. This profound transformation inevitably brings with it challenges that the company will have to face.

Questions may arise, including:

- Is the company ready to respond to all these challenges?
- Do they already have the necessary skills within the company to cope with this desire for renewal?
- Is the management aligned with these issues?
- What role will digital technologies play in the business model that has been pursued so far?
- Will it be necessary to think about a new "Beta project" and get a start-up out of the company focused on the development of digital solutions for customers?

Considering the theories mentioned in the above chapters and the company situation, it is interesting to try to answer these kinds of questions through the analysis of some surveys created using research protocols of different authors and adapting the questions to the case study.

In particular, we will talk about:

- Business Model Innovation, and how digital technologies and IoT have impacted to date and will impact in the next 3 years on some of the characteristic elements of Alpha that can also be found in a Business Model Canvas.
- Business Model Disruptiveness, and how some of the features that could possibly be found in a new Alpha business model, could impact negatively or positively on the traditional one, and consequently, understand if for the success of both would be better to separate or integrate them.
- Organizational Context, and the peculiarities found in Alpha, so as to understand if the organization could be ready to accept a new business model or not.

For all three macro-topics research protocols of different authors were used. These were then adapted to the nature and purpose of the research, as well as to the characteristics of the company Alpha, a B2B manufacturing company focused on the world of heating and with a possible future into the servitization field.

4.3 The business model innovation survey

The first survey protocol is the result of a study about several qualitative empirical business model papers. In particular: *Osterwalder and Pigneur* (2010) with their "Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers"; *Dijkman et al*. (2015) with: "Business Models for the Internet of Things"; *Arnold et al*. (2016) with: "How the Industrial Internet of Things Changes Business Models in Different Manufacturing Industries"; and finally, *Metallo et al.* (2018) with: "Understanding business model in the Internet of Things industry". The protocol provides for the submission of questionnaires to the top management team, or ,in any case, to the managers on whom the business decisions depend. The questionnaires asked to evaluate two things: the strategic importance of the 9 blocks of the Osterwalder business model canvas (using a 7-point Likert scale), and the importance of some elements reported in each block of the canvas (always with 7-point Likert). This method has been developed by the different authors mentioned above. They mainly took those elements that Osterwalder and Pigneur included in their study and partially modified them (eliminating or adding some features) depending on the sector they analysed. What was done in this case was to mediate between the elements transcribed by Osterwalder, Dijkman, Arnold and Metallo, and the elements designed "ad-hoc" for Alpha. This reasoning has been followed because the elements used by the authors concern both the IoT world (with which Alpha is interfacing) and the concept of servitization (a subject that the company is beginning to address and that, as already mentioned, it would like to implement the coming years).

The aim is to understand if the company assesses that in the next 3 years certain elements within the business model may change, in favour of elements more in line with the technological trends of the moment. It is also interesting to understand where Alpha is positioned with respect to the types of companies mentioned in *Arnold et al*. (2016) and what are its peculiarities, the strategic elements of greater importance and the most relevant blocks according to the sample to which the questionnaire was submitted. In Alpha the questionnaire was submitted to the entire board of directors, consisting of people who have the opportunity, and the responsibility, to set the guidelines of the company. In particular, the board of directors is composed of the CEO, the Chief Financial Officer, the Digital Transformation Manager, the Customer Chief Officer, the Op-

erating Chief Officer and the Product Chief Officer, the Human Resources Officer and the Governance & Legal Chief Officer; all people who have been part of Alpha for more than 5 years.

The questionnaire was developed on Survey Monkey and it was divided into two sections.

In the first one we asked to assess the relevance of the impact of technologies on certain elements of the business model. The elements were those transcribed within the blocks of the Canvas (Table 4.2). The questions were:

- Assess the impact of technologies on aspects of Alpha's customer relationships
- Assess the impact of technologies on Alpha's ability to serve market segments
- Evaluate the impact of technologies on the effectiveness of Alpha's Value Proposition
- Evaluate the impact of technologies on Alpha's sales channels
- Evaluate the impact of technologies on Alpha revenue streams
- Evaluate the impact of technologies on Alpha's internal resource needs
- Evaluate the impact of technologies on Alpha's activities and operations
- Assess the impact of technologies on the need for partners for the development of Alpha's products/services
- Assessing the impact of technologies on Alpha’s costs

In particular, a “matrix of drop-down menus” was used, so that it was possible to column the answers according to whether the technological impact "until now" or "in the next 3 years" was considered. A 5-point Likert scale was used, (1 = completely irrelevant; 2 = irrelevant; 3 = neutral; 4 = relevant; 5 = very relevant). In order to avoid complicating the answers more than necessary, I did not use a 7-point scale (as had been done by the various authors, following the methodology of *Dillman,* 2000). The respondents would have found it difficult to make sense of intermediate values, as in the case of 2 and 3 or 5 and 6 (in the 7-point Likert scale). Moreover, I gave the possibility to answer "I don't know" if the element I was asking to give a value did not fall within one's field of competence.

The second section of the questionnaire involved giving a value (on a 5-point Likert scale, again) to the strategic importance of each of the 9 blocks on which the Canvas Business Model is based. Before the two sections, a premise was made to explain in a

concise and, at the same time, as explanatory as possible way, the reason for the questionnaire, its purpose and its constitution.

This, and the other two questionnaires that will be discussed later, were presented during a board meeting, in which I had the opportunity not only to participate, but also to present all the work carried out up to that day.

4.3.1 Methodology and results

Obviously, it should be taken into account that the questionnaire was submitted to a very small population. Unlike the papers I was inspired by, I didn't submit the survey to several companies but concentrated on the one I worked on. The analysis is in this sense, limited.

We can now analyse the method and results obtained by following mainly the texts of *Dijkman et al*. (2015) and *Metallo et al*. (2018).

The results were downloaded both as "data of all responses" and as "summary data". I want to remind you that the aim was to analyse the impact of digital technologies on Alpha's business model both "until now" and "in the next 3 years".

As for the "data of all responses", 220 values were obtained for the section "until now" and 219 for the section "in the next 3 years" (considering the evaluation of 33 items and 7 respondents). You can refer to the appendix to see the questionnaires.

	"Until now" section	"In the next 3 years" section
Mode	2	4
Median	2	4
Mean	2.44	4.22
Std. Dev.	1.16	0.79
Variance	1.30	0.60

Table 4.1 "Descriptive statistics cosidering the entire dataset", own elaboration.

As we can see from the short processing, variance and standard deviation of the first section are larger than those of the second. This makes us understand how there is a greater dispersion of the data compared to the average value. Seeing the single results obtained for the single respondents, in fact, we can see that in this section there are quite different points of view/opinions about the impact that digital technologies have had so far on the elements of the Alpha's business model, and this is also seen when calculating the inter-quartile range (IQR) of each item (available in the Appendix), which is a measure of spread showing whether the responses are clustered together or scattered across the range of possible responses (*Kostoulas,* 2014), and in this case the inter-quartile ranges have different values for each item. Another possible explanation can be given by the fact that, until now, digital technologies have only impacted on certain aspects of company life, such as pre- and post-sales assistance, or the co-creation of products, and therefore only the people directly involved in those topics are aware of the impact that technologies have had.

It is interesting to see how there is an alignment of thinking regarding the future vision of the company. There is in fact the idea that in any case (and this will be better seen also with the rest of the analysis) in the future, even not too far away, there will have to be changes in the company, to respond to this phenomenon.

The following table (Table 4.2) should represent a Canvas business model for Alpha, which differs from the previous one in that it is less specific (some characteristic elements reported in the previous Canvas BM are missing), but more oriented towards IoT and digital technologies and more in line with the BM developed by the authors mentioned above. It shows all the items in the questionnaire. In fact, we asked to evaluate the impact of digital technologies and IoT on these elements "until now", and what will be the impact "in the next 3 years". The composition and meaning of the table are then explained in detail.

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	CUSTOMER RELATIONSHIPS	CUSTOMER SEGMENTS
• Intermediate customers (OEMs) • Data analysts & service partners • Suppliers	• Factory production activities • Maintenance/ development activities for platforms • Management of partners and suppliers • Marketing and sales • Customer service and support	• Innovative Services • Improve product performance • Increase client proximity • Developing services as "added value"	• Personal pre/post sales assistance • Key account management • Co-creation • Customization of services	• Intermediate customers (OEMs) • Final client/end use • Distributors/installers
	KEY RESOURCES • Physical resources • Human resources and know-how • Financial resources		CHANNELS • Indirect sale • Online sale • Sales agents	
COST STRUCTURE • Personnel costs • IT costs • Product development costs • Data analysis & cloud computing costs			REVENUE STREAM • Sales of products • Usage fees • Customizations • Spare parts	

Table 4.2 "A new Alpha Canvas Business Model, considering the impact of digital technologies and IoT", own elaboration referring to Osterwalder and Pigneur (2010), Metallo et al., (2018), Dijkman et al., (2015).

The weighted averages of the scores of each element of each block and the mean of the totality of each block were calculated. Considering only the section "in the next 3 years", those elements with an average score higher than the average of the scores of the block itself have been highlighted in dark yellow (Table 4.2). Starting from the block of key partners, it is interesting to see how **data analysts** and **service partners** (mean = 4.43; S.D. = 0.49) are expected to play an important role, due to the impact that technologies will have on Alpha. In terms of key activities, **sales and marketing** (mean = 4.57; S.D. = 0.49) will play a key role with the growth of IoT technologies, so there is an awareness that a function like marketing will play a significant role even though it is a B2B manufacturing company**.**

Customer service and support (mean = 4.57; S.D. = 0.49) will also be significantly affected by the technologies. The same applies to **human resources and know-how** (key resources block) (mean = 4.71; S.D. = 0.45). Above the average in the value propositions block there are **innovative services** (mean = 4.29; S.D. = 0.70) and **developing services as "added value"** (mean = 4.43; S.D. = 0.49).
In customer relationships, **co-creation** (mean = 4.57; S.D. = 0.49) and **customization services** (mean = 4.71; S.D. = 0.45) will be influenced by technology, while in customer segments OEMs will be affected. In this block, on the other hand, end customers/end users are below average (mean = 4.29; S.D. = 0.70), which makes it clear that there is still no clear vision that the company could, thanks to the IoT, get closer to the end customer, bypassing, at least in part, distributors and OEMs customers.
Online sales (mean = 4.33; S.D. = 0.47) are also above average, which may suggest that respondents are thinking of using technology platforms to sell. Obviously, with the increase in technological systems, **costs** (especially for IT, product development and cloud computing) will increase. Finally, it's curious how above average in the revenue block there are **customizations** (mean = 4.33; S.D. = 0.75) and **spare parts** (mean = 4.43; S.D. = 0.49), but not usage fees. To this last element, at least conceptually, I had thought of the possibility of giving the OEM customer platform to access to control and monitor their installed systems (boiler with Alpha Link inside, for example).

After the analysis of all the elements of the blocks of the BM, we can analyse the second question of the survey, about the strategic importance of the blocks themselves (Figure 4.4). Also in this case, an average of all the results obtained from the survey was made. The standard deviations of each block were also calculated.

In Table 4.2 are highlighted the blocks with higher average value with respect to the average of the blocks themselves (4.43). Value proposition, customer relationships and key resources are the blocks with the highest score. The key activities block is instead equal to the average (highlighted in light yellow).
As can be seen from Figure 4.4, all elements are considered important by the small population of the survey, but some elements are more important than others.

Mean	S.D.
4,86	0,35
4,86	0,35
4,71	0,45
4,43	0,73
4,29	0,88
4,29	0,70
4,29	0,70
4,14	0,99
4,00	0,76

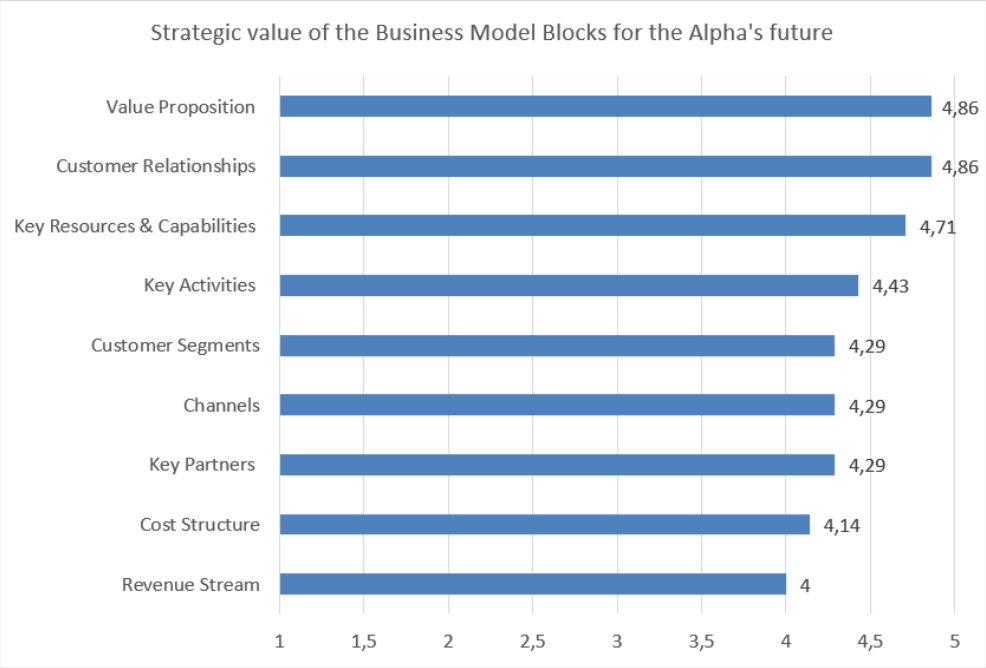

Figure 4.4 "Weighted averages of the strategic value of Business Model blocks and standard deviations related", own elaboration.

By slightly reworking the values of all the elements of the blocks, we can use them with the results obtained from the evaluations of the "strategic value" of the blocks themselves in order to calculate a sort of “disruptiveness of technology” index.
Disruptiveness, in this case, can be seen as the sum of the perceived impact of technologies on the blocks and the importance that is given to the block itself.

(DIGITAL TECHNOLOGIES IMPACT ON BLOCK) + (BLOCK’S STRATEGIC VALUE)

The results, shown in Figure 4.5, are in line with the values presented in the previous elaborations. The blocks in which the disruptiveness is stronger are customer relationships, key resources and value proposition. Therefore, digital technologies (IoT) will have a stronger and more disruptive impact on those blocks considered by the management to be very important and on which a strong impact is expected in the next 3 years.

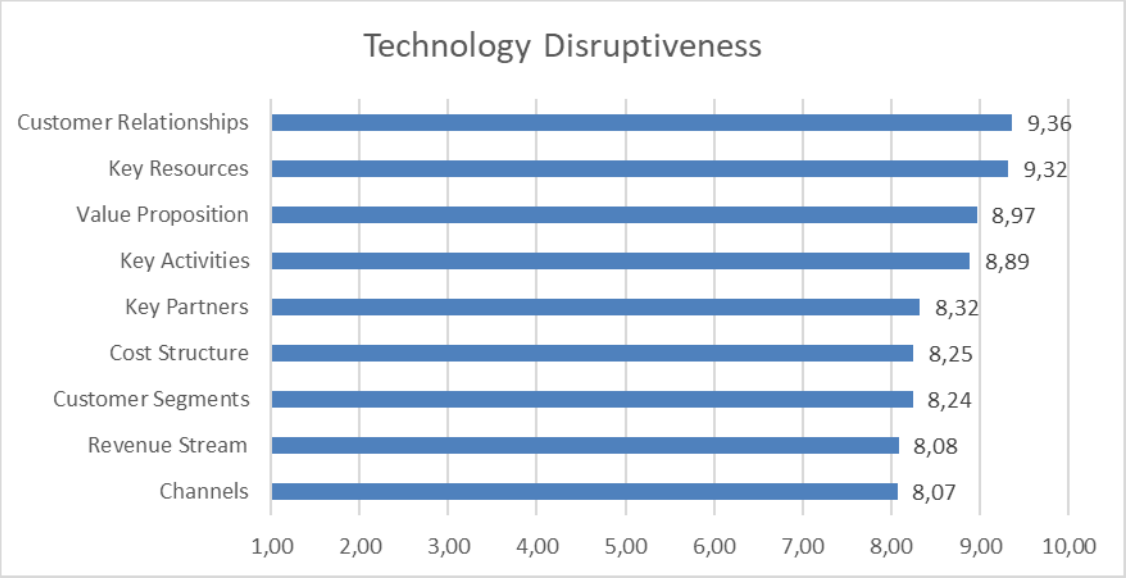

Figure 4.5 "Level of disruptiveness on the Canvas BM Blocks", own elaboration.

We can use these most important blocks to see which the major differences in the impact of technologies are in the two sections "until now" and "in the next 3 years".

Starting from the value proposition (Figure 4.6), we can see that those elements that will be most influenced by technologies in the future, are not the same as now. For the "until now" section, in fact, the above-average elements are "Increasing proximity to the customer" and "improve product performance".

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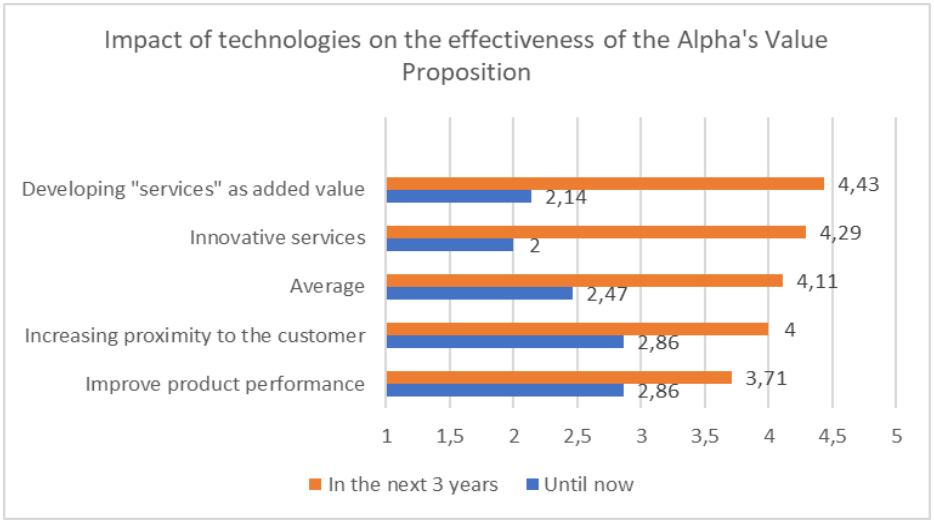


Figure 4.6 "Weighted averages of each element of the Value Proposition block", own elaboration.

Even in the case of customer relationships, there are more important elements of disagreement between the two sections. In fact, in the past and present section, key account management and personal/post sales assistance prevail. These elements are not very far from the average in the section that looks to the future.

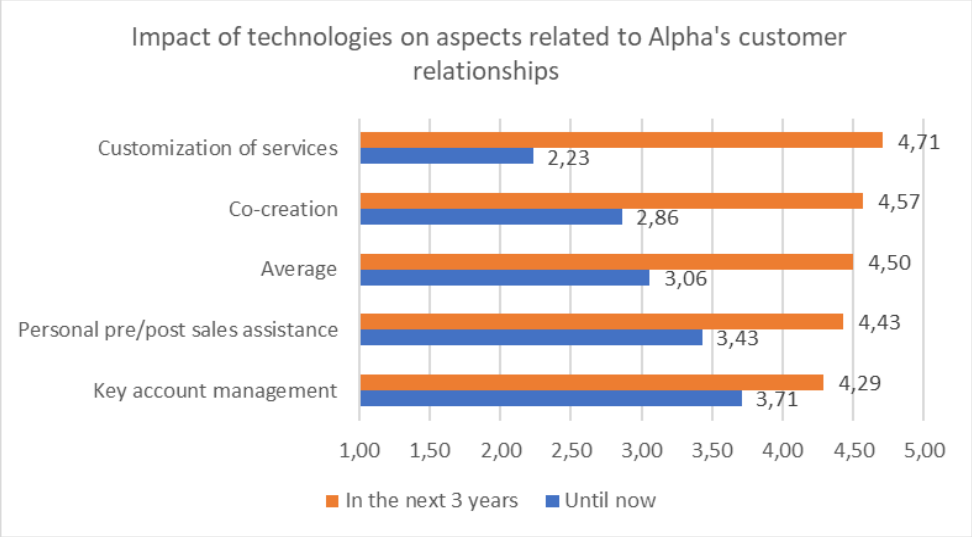


Figure 4.7 "Weighted averages of each element of the Customer Relationships block", own elaboration.

The last block completely above average is the key resources & capabilities block.
In this case, the impact of digital technologies is considered strong (or above average scores) on financial resources. On the other hand, on know-how and human resources, the "until now" impact of technologies is considered to be very low. For all other differences it is possible to refer to the Appendix.

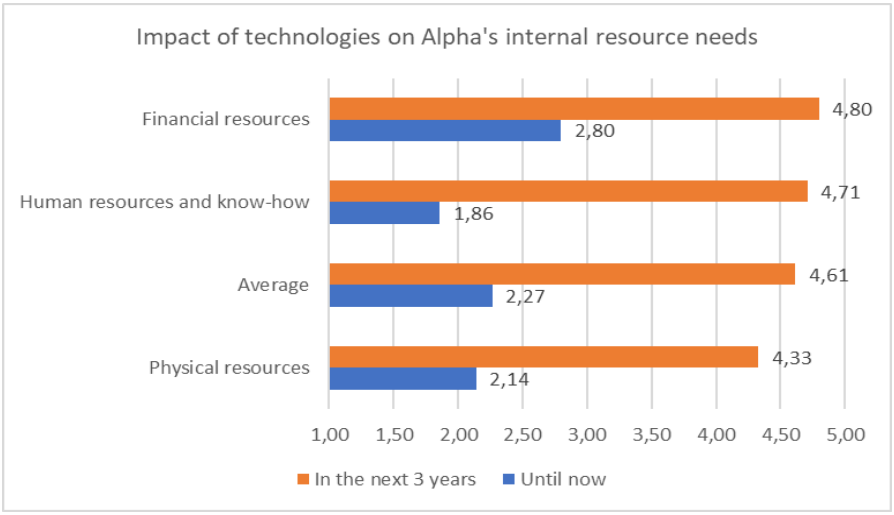


Figure 4.8 "Weighted averages of each element of the Key Resources block", own elaboration.

It is interesting to see how, although the one analysed is a manufacturing company, there are elements in common with what has been found by the authors. For example, both in *Dijkman et al.* (2015) and in *Metallo et al.* (2018) emerges a fundamental importance of the value proposition as a central element of the business model canvas in IoT companies. Also in the case of Alpha, the value proposition is relevant. The other two elements that emerge in Alpha are precisely the elements that are mentioned by Metallo and Dijkman, in order, key resources and customer relationships.

The findings are in line with the paper by *Arnold et al.*, (2016) was also important. What emerges, that is entirely in line with what came out from the surveys and the various meetings in which I had the opportunity to participate directly, is the fact that, to cope with the major changes that IoT brings with it, it will be necessary to implement the skills of the workforce, create new networks of partners (integrating them into value creation activities) and develop software know-how. Partially resuming the implications of *Arnold et al.*, (2016), in addition to the role of problem-solvers that people will have to develop in the short term, there must be human resources development activities, enhancing interdisciplinary education in different areas of study. Finally, it can be said that although large investments are required to bring the company to good levels of Industrial Internet of Things (or even simple IoT), these also bring several possibilities to reduce the costs of the company.

4.4 The separation VS integration survey

As already seen in chapter 3, the concept of "ambidexterity" is very broad, and it is possible to see it from different points of view. Of the various authors analysed, will be taken into account for the purposes of the active research mainly Markides and Charitou. In particular, we will try to apply the concept of dual business models and disruptiveness of the new business model. A preface is necessary before going into more detail on the analysis made. The Alpha company does not have among its short-term plans the creation of a new business model but considering the developments it is making in the field of SMART products and having understood, during my internship period, what are the points of view of some important players within the company itself, it can be said that it will not be too long before we start to talk seriously about this possibility.

For now, and for the purposes of the dissertation, the new business model that will now be discussed, is completely "prospective". The questions and answers, which we will see soon, are based on the feelings, points of view and ideas of the same people involved in the previous questionnaire.

4.4.1 Methodology and results

Again, a survey was created with Survey Monkey, and this time too, 5-point Likerts were created (1=completely disagree; 2=disagree; 3=neutral; 4=agreed; 5=completely agree). The sources on which I relied to create this questionnaire are two: *Markides & Charitou* (2004) and *Markides* (2013). The questionnaire is based on the characteristics and variables already cited in paragraph 3.3.
The final aim of this survey is to understand if a new prospective business model could be integrated with the traditional one of Alpha or if it should be separated. With this, we essentially refer to the matrix developed by Markides and Charitou, reported in Figure 3.3.

As in the previous case, the survey sections are preceded by a preamble to the survey, explaining the elements and purpose of the survey. The sections in this case are 3, the first is composed of 4 questions aimed at understanding if there are synergies between the traditional business model and the possible new one. In particular, the question is whether the new business model will be able to exploit Alpha's current resources and skills.

- Hardware and software resources
- Capabilities (knowledge, skills, professionality)
- Customers (customer segments and market)
- Distribution channels (actors participating in the distribution)

The second section aims to identify possible conflicts that may arise between the two business models. In particular,

- Risk of cannibalizing the existing customer base
- Risk of shifting customers from high value to low profit margin assets

- Risk of destroying or diminishing the value of the existing distribution network
- Risk of compromising the quality of service offered to customers
- Risk of diminishing the company's image or reputation and the value associated with it
- Risk of destroying the overall organisational culture
- Risk of adding activities that confuse the worker about the company's priorities and incentives
- Risk of adding activities that confuse the customer about the company's priorities and incentives
- Risk of loss of organizational focus in trying to do "everything for everyone"

The last section consists of a question with different possible answers, and concerns the place where, according to respondents, should be placed the new business model

- Independent company with its own brand and balance sheet
- Internal division with own budget
- Office without a specific budget
- No organisational separation
- Other (specify)

This time, the sum of all answers is 91.

	Overall survey
Mode	2
Median	2
Mean	2.5
Std. Dev.	1.25
Variance	1.60

Table 4.3 "Descriptive statistics cosidering the entire dataset", own elaboration.

However, going to examine the two groups (synergies and conflicts) separately, obviously, we find different results.

	Synergies section	Conflicts section
Mode	4	2
Median	3	2
Mean	3.32	2.2
Std. Dev.	1.23	1.11
Variance	1.50	1.2

Table 4.4 "Descriptive statistics cosidering the two sections", own elaboration.

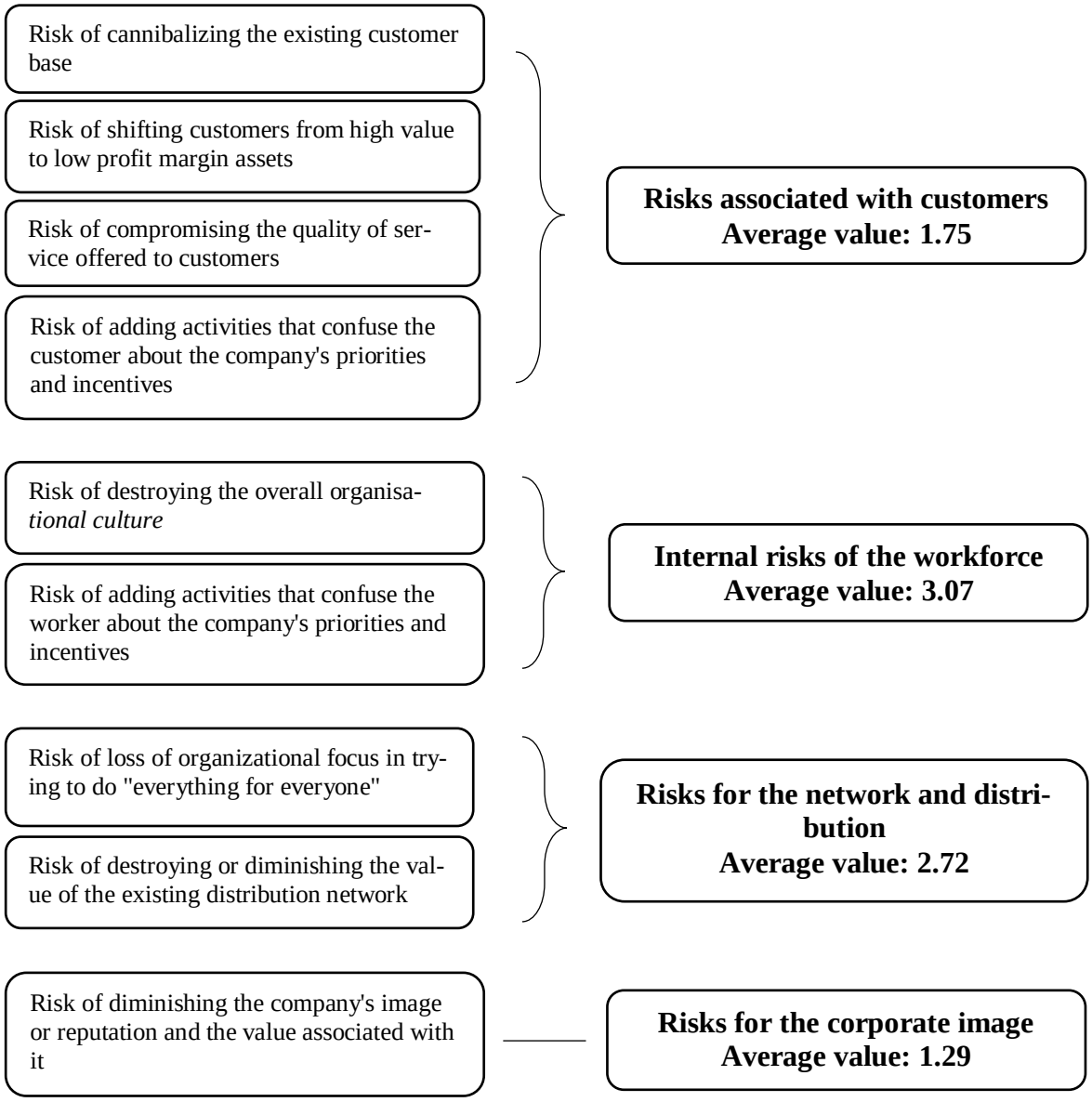
From this, we can see that there is a tendency to see the new possible business model as quite synergistic with the current one. Variance and standard deviation, on the other hand, remain quite high, so there is not a completely univocal view among respondents. Here too, however, it should be noted that a 5-point Likert lacks finesse compared to a 7-point or even a 10-point Likert scale.

With regard to conflicts, since more are defined respect to the four 'synergies', the results are more in line with the overall data.

According to the respondents, the value given to the possible risks is not so high as to have to consider the idea of a new possible business model separate from the traditional one.

By combining the risks under the same topics, we can create four "macro categories" so that they can be compared with the four of the synergies. The categories are as follows:

- Risks associated with customers
- Internal risks of the workforce
- Risks for the network and distribution
- Risks for the corporate image



	Grouped risks
Mode	1
Median	2
Mean	2.21
Std. Dev.	0.97
Variance	0.90

Table 4.5 "Descriptive statistics cosidering the grouped risks", own elaboration.

We can also examine what are the elements within the synergies category and what are those within the risks, whose weighted averages are above the overall mean.

As we can see in Figure 4.9, hardware and software resources and distribution channels are the elements with the greatest synergies, according to respondents. As is normal for a manufacturing company, capabilities related to the IoT world are seen as something that will need to be implemented and increased. The difference between the element "distribution channels" and "customers" is curious. If, in fact, the former have a weighted score of 3.57 (above average) and therefore it can be said that the respondents believe that the new potential business model can maintain the same distribution channel as the traditional one, on the other hand, we have a score below average, and therefore it can be deduced that the respondents believe they can potentially serve different market segments (of different BMs) through the same distribution channel.

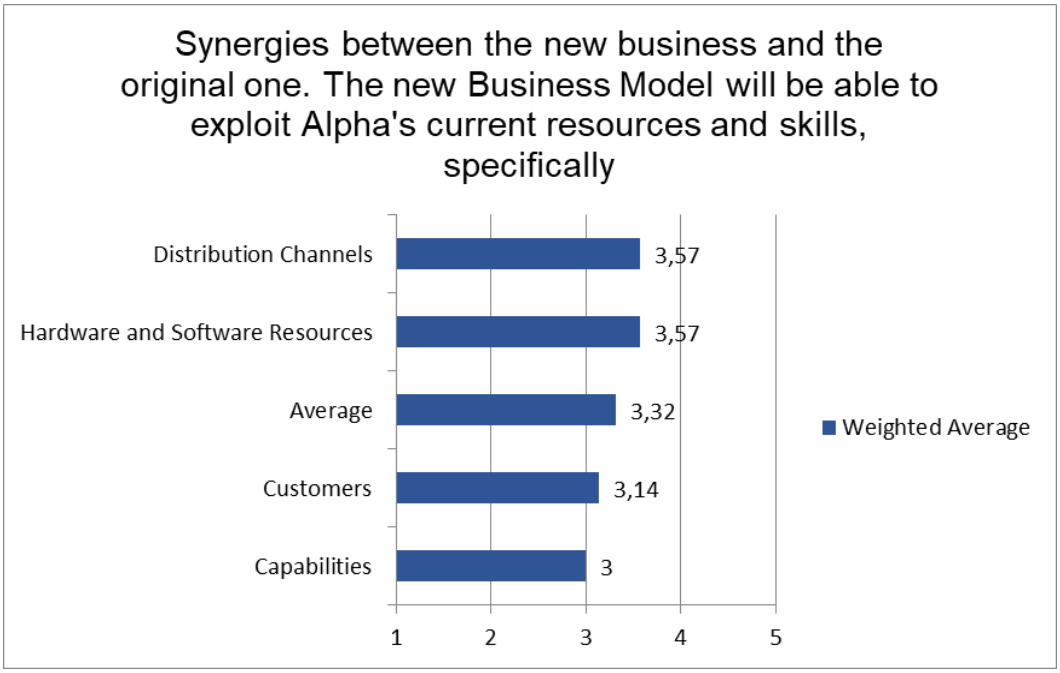


Figure 4.9 "Weighted averages of synergies between the new and the traditional business model", own elaboration.

Figure 4.10 "Weighted averages of conflicts between the new and the traditional business model", own elaboration.

Figure 4.10 is about the risks section. In this case, those elements above average are also those that respondents are most concerned about in view of a new business model.

The biggest fear is that a new service-driven/IoT-based business model could somehow undermine the corporate culture that has been pursued so far. The other above-average elements, which can be defined as the most important risks, are: “the risk of losing the organizational focus in trying to do everything for everyone”, “trying to satisfy different market segments with different solutions”; “the risk of confusing the same workers on what become the priorities of the company”; “the risk of undermining its distribution network”. Logically, all these fears are justified, as the B2B world is a complex world made up of inter-relationships in a value chain composed of different actors.

The first and third riskiest elements, here, are precisely those that fall within the "internal risks of the workforce" category created by putting together the different items. The other two elements above the average are those that are part of the "risks for the network and distribution", second (2.72), of the four categories. In more general terms, these two categories refer to both internal and external elements of the company. The main concern, however, falls precisely on the internal environment. This is therefore a very important issue that will have to be addressed, and at the same time a

challenge for the HR, which, in the event that a new business model is really created, will have to commit to making this transition as lean and clear as possible for all employees.

After this analysis of the data obtained from the first two of three questions of the survey, we can apply the matrix of *Markides and Charitou* (2004) in which, as explained above, are divided four quadrants to understand, based on synergies and conflicts, how to cope with the duality between new and traditional business model.
A simple Cartesian plan was created, consisting of synergies on the x-axis and conflicts on the y-axis (Figure 4.11). The scale goes from 1 to 5 so that, graphically, the value 3 can be the central one, as it is in a 5-point Likert scale. The average value of the weighted averages of the different items is therefore positioned in the lower right quadrant (3.32, 2.21).

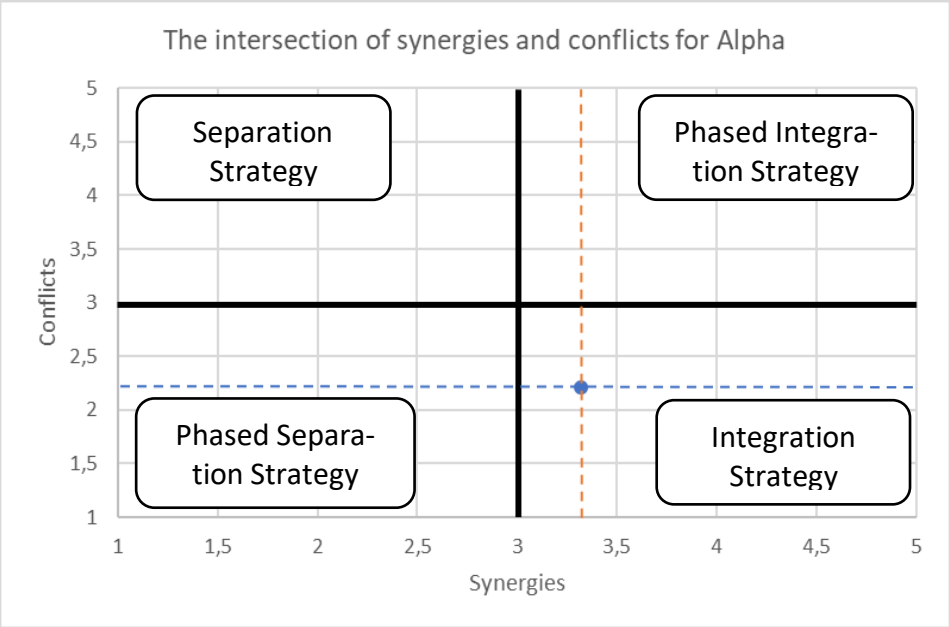


Figure 4.11 "The intersection of synergies and conflicts for Alpha", own elaboration considering Markides and Charitou.

Therefore, it would seem that Alpha could be among those companies that respond to the dualism of business models by integrating the new one, based on digital IoT technologies.
Having said that, it can be seen that the position is not central inside the quadrant, but, on the contrary, moved towards the left end. Synergies are not considered so strong and, at the same time, some risks are evaluated in a fairly high way. In principle, the

company is located in an almost central area. However, we cannot overlook the fact that this is a mere application of a protocol of applications submitted to some people of the company. In addition, a 5-point Likert scale was used (i.e. rougher than a 7-point scale). Having said that, and adding that the reality is always more complex than what are theoretical studies, we can concentrate more on the "zone" in which Alpha finds itself. Here, in fact, we have important but not extremely synergistic elements. In fact, none of them exceeds the 4 points of the scale and therefore there is an insecurity that all those elements can be used and have value for both the traditional and the new possible business model. Likewise, considering the possible conflicts, these have on average a low enough value to place the company in a point where integration is fine, but it must be taken into account that some elements of risk have been assessed in a fairly high way. In particular, it is precisely those elements that fall within the grouping concerning the "internal risks of the workforce". Therefore, before thinking about integration, these internal elements that could lead to conflicts between the two business models should be taken into consideration.

Quite contrary to this reconstruction are the answers to the third question (question present as “title” in Figure 4.12) in this second survey. In fact, if the first two sections asked to evaluate possible synergies and possible conflicts between the traditional and a potential new business model, without mentioning the breakdown into integration and separation, the third question directly asked the respondents' opinion on where a new business model should be born. The results were that three people believe it is necessary to create a completely new company, with its own brand and balance sheet. Three other people think that it is necessary to implement an internal division with its own budget, and finally, a single person believes that no separation is necessary (Figure 4.12). The first two answers can be placed in a larger category, "separation of some kind", while the single answer and the unquoted answer ("office without a specific budget") can form the "integration" category.

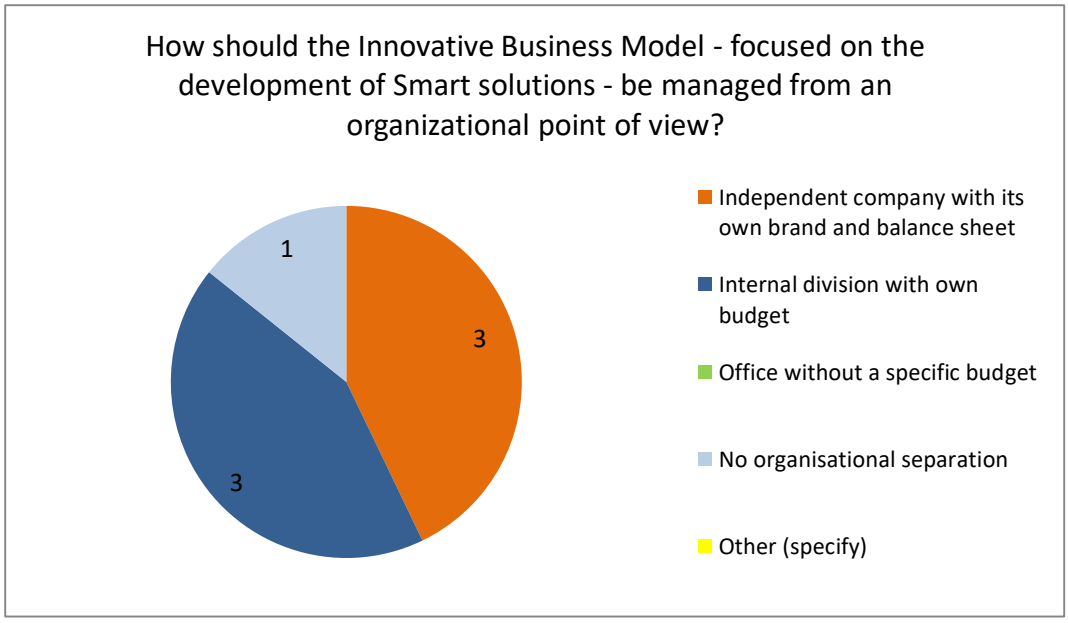
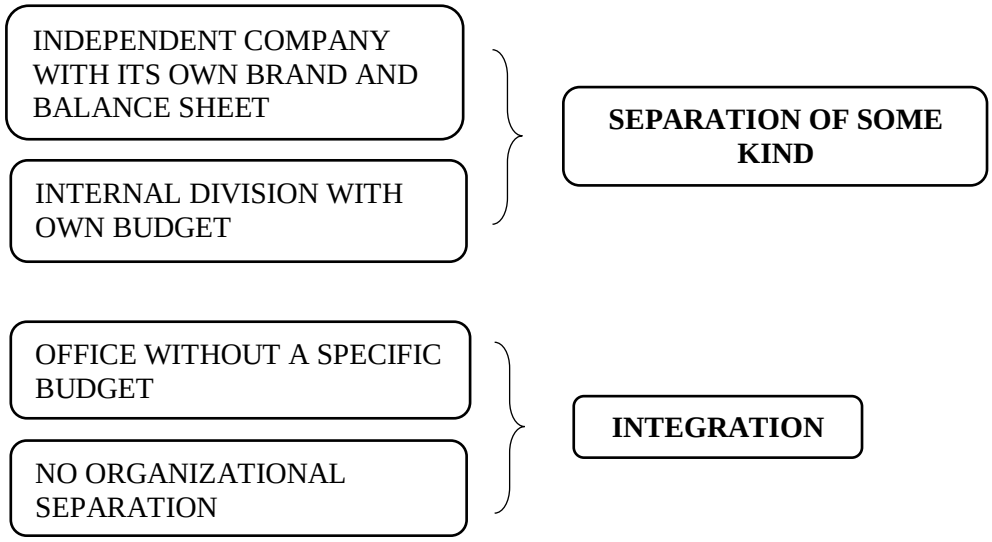


Figure 4.12 "Location of a possible new business model", own elaboration.



The grouping "separation of some kind" consists of two elements that conceptually can both be seen as separations from the traditional business model. The first is a de facto separation, with which the company would outsource the new innovative business model by creating a real company (or start-up); the second element refers to a “in home” separation, with which there is no origin of a new proprietary brand or its own balance sheet, but rather a division (which for Alpha would be the third) with its own budget.

The second grouping, on the other hand, refers to a real integration with the traditional business model. The first element inserted here in fact refers to the creation of an office (without a dedicated budget) in which the innovative business model could be developed. The second element within the "integration" grouping refers to the fact that there is no need for any kind of separation, and that, therefore, the activities could be carried out by the same people in the same offices, mediating and balancing the tasks for the traditional and the innovative business model.

In this perspective we can see how there are elements that would lead us to think that a new business model could be integrated with the traditional, and in addition, it would also have the opportunity to do so (following *Markides and Charitou*, 2004), but at the same time, when asked directly to think about where to place this new BM, people think that it is better to separate it in some way from the traditional. Further discussions about this topic will be presented in the Conclusions chapter.

4.4.2 Ambidexterity in Alpha, a short questionnaire

To conclude this analysis a short questionnaire was created, composed of 6 items (3 referring to the concept of alignment and 3 to the concept of adaptability). The two terms allude, in order, to the coherence among all the patterns of activities in the business unit, which work together toward the same goals; and to the capacity to reconfigure activities in the business unit quickly to meet changing demands in the task environment. (*Gibson and Birkinshaw*, 2004). With the results it is possible to make a comparison with the answers given by the same subjects regarding the so-called structural ambidexterity (survey on disruptiveness of a new business model).

The items used are as follows:

For alignment

- The organisation's management works consistently to support the company's objectives

- Management is able to direct company resources towards activities that prove to be productive
- The objectives set by the management are well defined and do not lead to the overlapping of roles

For adaptability

- Management encourages the renewal of company practices and habits
- Management is flexible enough to respond quickly to market changes
- The company organization is able to evolve rapidly according to the priorities that emerge

As with previous surveys, we can also use this to make a brief analysis of the data obtained. In particular, considering the whole group (alignment and adaptability) as a single set, we found the following results:

	Ambidexterity
Mode	4
Median	4
Mean	3.50
Std. Dev.	0.78
Variance	0.82

Table 4.6 "Descriptive statistics cosidering the entire dataset", own elaboration.

	Alignment section	Adaptability section
Mode	4	4
Median	4	3
Mean	3.67	3.33
Std. Dev.	0.78	0.84
Variance	0.60	0.70

Table 4.7 "Descriptive statistics cosidering the two sections", own elaboration.

For both sections the values obtained are quite high (remember that the sample is limited to the Alpha's board of directors). Moreover, compared to the other questionnaires the general picture is more uniform, in fact the variances are smaller and below 1.00. Therefore, there is a common perception of what the company situation is in terms of short- and long-term vision. It is possible to visualize graphically what are the weighted averages of the votes given to each of the six elements.

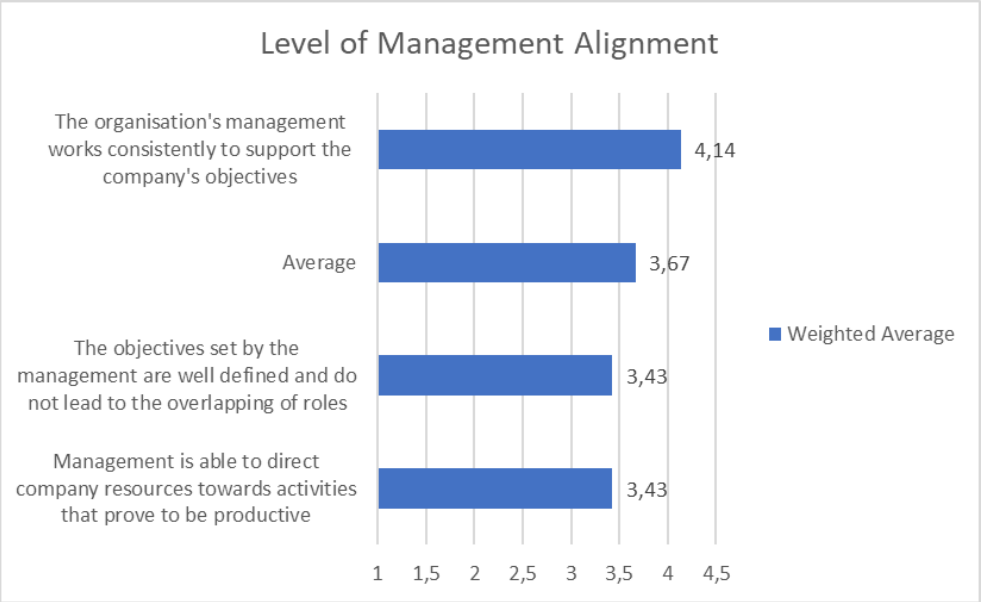


Figure 4.13 "Weighted averages of alignment elements", own elaboration.

As you can see from Figure 4.13, on only one element there was a fairly strong opinion, with which the score 4 is passed. The topic that emerges is that, in the company, the objectives that are set as main and fundamental objectives are seen to be respected and supported by all managers. This is certainly an essential and significant fact, but at the same time it could bring out a problem that in a longer term perspective, and in such a complex and competitive environment, could prove important, that is, the fact that too much homogeneity of thought and vision does not lead to the development of new creative solutions to stand out from the competition, or, differently, to find new possible markets. The other two topics on which this first section of the questionnaire is based are precisely the fact that the overlap of roles is not perceived by managers, and in this case the score is more than the central value, 3, and the fact that the activities carried out and desired by managers are then actually productive. Also in this case the score is

above 3 points and this is definitely a good sign for Alpha. It means that the investments and projects carried out are first evaluated and studied.

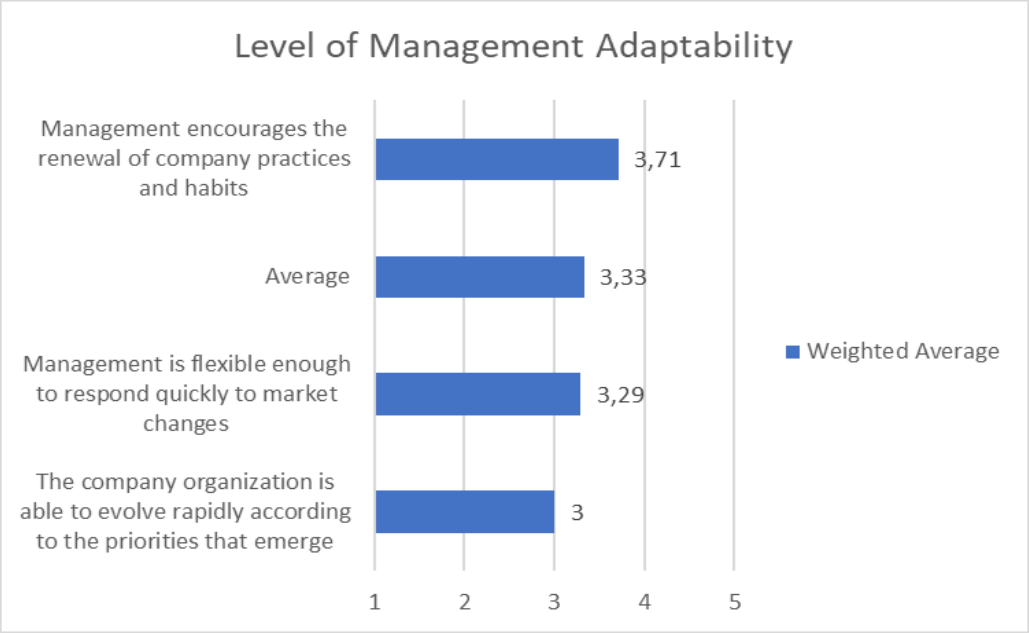


Figure 4.14 "Weighted averages of adaptability elements", own elaboration.

Analysing the section "adaptability" (Figure 4.14) we notice that the average, and in general the values, drop a bit. The element that has been assigned a higher score is the fact that managers see themselves as advocates of corporate renewal (score that, however, does not reach the 4 points). The other two elements, which more or less fall within the same macro area (i.e. responses to external changes) revolve more around the central value 3. This could partially fall within the concept of before regarding the company objectives, in fact the unique corporate vision always respected and maintained by management, could make it difficult for the same to intervene in the event of external factors or new priorities that emerge.

The following figure (Figure 4.15) shows the two averages of the two sections on a Cartesian plane. In the centre, an area which can be an average zone, has been marked (light grey circle).

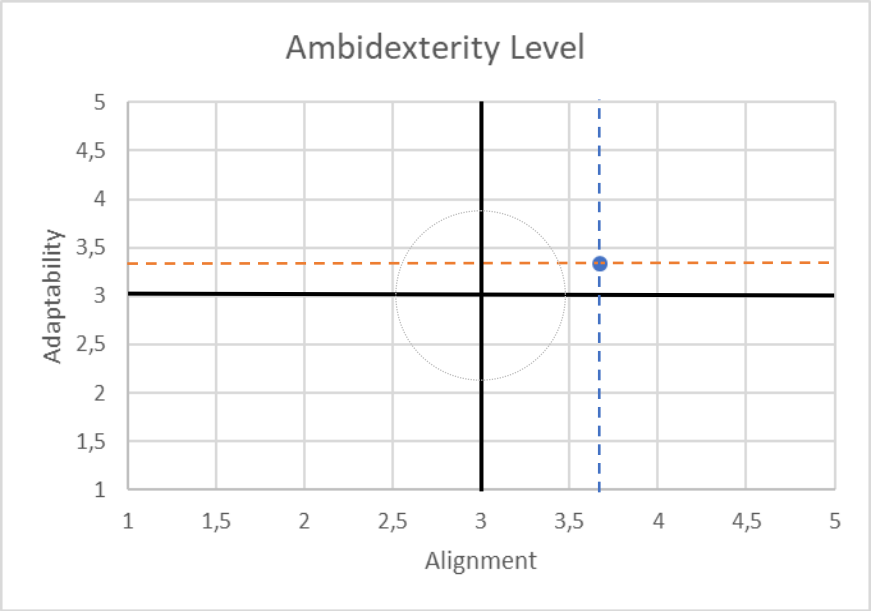


Figure 4.15 "Ambidexterity matrix considering alignment and adaptability variables", own elaboration.

This is a starting point from the scheme developed by *Gibson and Birkinshaw* (2004) but remains in line with what was previously done in the dissertation. In fact, we can see how, on the x axis we find the alignment (which refers to the exploitation of its business model) and on the y axis the adaptability (which recalls the exploration). Conceptually, one could think of the formation of four areas. Starting from the area closest to the origin of the axes, we can find a company that is either in difficulty or still in its infancy, but that does not present the characteristics of what can be a successful start-up. On the right, we find an area where a company is definitely performing in the short term, works well and is focused on its core business. It could be defined as a "successful focus in the core business quadrant". The problem in this case could be the lack of preparation to face a changing future.

In the top left, we find an opposite situation (perhaps unrealistic), in which a company struggles to work in the short term, to focus on defined projects, in which there may be confusion of roles and company objectives, but at the same time believes that it can respond to external or future challenges. In this case, the problem could arise to have high costs to explore different solutions and possibilities without being able to return with the earnings. The last box, in which in this case Alpha is located, could be that of a successful ambidexterity (at least theoretical), i.e. an area where the company has a strong

alignment and therefore focuses on its core business, but at the same time believes it can respond to the challenges that may arise.

Now we can make a comparison with what were the results of previous surveys. In particular, the second questionnaire has seen the emerging idea that a new possible business model (based on digital technologies and IoT) could be integrated with the traditional one, if we keep as variables the synergies and conflicts between the two business models. That result would be in line with those of this questionnaire, because, since the TMT has characteristics that would recall a fair level of ambidexterity, one could actually think that the management seems to be able to work with both, tasks regarding short-period objectives and core business, as well as, tasks regarding possible future paths and long-period objectives. And, therefore, an integration approach seems to be the best solutions (i.e. separating the innovative BM shouldn't be necessary).
But, if we compare the results of this questionnaire with the third section of the second, (in which we were asked directly where a new business model could be inserted) we find again the incongruence that emerged previously between the theoretical reconstruction made by Markides and Charitou (2004) and the results of direct questions. If, on the one hand, we have managers who respond sufficiently well to the questions posed by ambidexterity, on the other hand, most of them consider it more appropriate to outsource / separate core business from "exploratory" business. This difference can be explained by the fact that the management, even if they do not see big conflicts between the traditional business model and the new one, but rather they find some synergies, do not assess these reasons enough to integrate them together, or more simply, do not associate these two elements to the positioning of the new prospective business model.

4.5 The organizational context survey

If the first two surveys were created and designed for the TMT, or in any case for the board of directors, (as done by the mentioned authors), the third and last questionnaire was developed for a wider audience. Considering *Birkinshaw and Gibson* (2004) first, and *Agostini et al*, (2017) then, I created a survey to verify how people within Alpha assess the context in which they work every day. Also in this case the quickest and best way to get answers was to create a questionnaire through Survey Monkey divided into 3 sections. The Likerts (always with 5 points) were divided as follows: 1 = completely disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = completely agree. The questionnaire, given the nature of the topics covered, was completely anonymous, without any reference to one' s level or any other information that might have put the respondent in difficulty.

The first section concerned the performance management variable, the second the social support and the third the characteristics of the middle/senior managers. In the paper by *Agostini et al*., (2017) both, those items developed by *Birkinshaw and Gibson* (2004) and some developed by the authors themselves were used.

The sentences to be evaluated were taken from those used by the authors mentioned above, reworked in Italian and adapted for the context of Alpha.

The basic idea was to obtain results so that Alpha could be placed in one of the quadrants of the matrix created by *Birkinshaw and Gibson* (2004) (Figure 4.16). The authors develop this matrix which is based on the two axes performance management (x axis) and social support (y axis). Their combination leads to 4 ideal areas. High levels of performance management and social support create a high-performance organizational context, which gives ambidexterity the opportunity to grow. If both values are low, however, we find ourselves in a low performance context, in which individuals struggle either to be aligned or adaptive, and thus to create any kind of ambidexterity. Between these two categories two sub-optimal levels are established. We have a so-called burnout context when social support is very low and there is a strong orientation towards results. In this case, people are able to perform well but for a limited period of time; there is also a strong turnover and the context is highly individualistic and authority-driven. The other

sub-optimal context is called country-club context, in which employees hardly express their potential, in a very collegial environment.

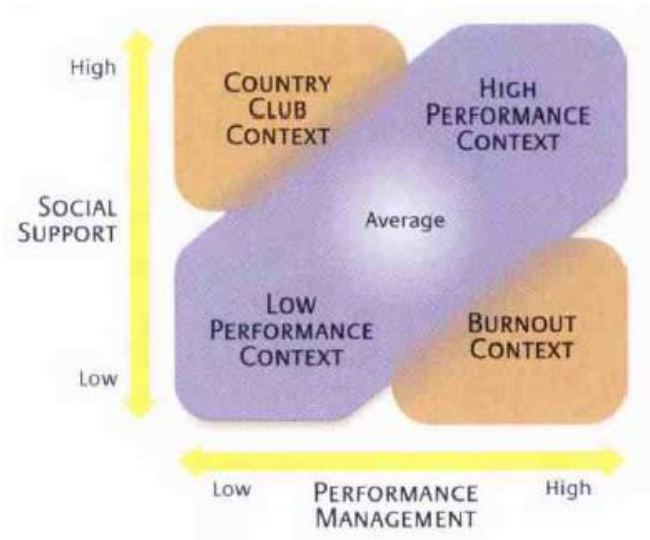


Figure 4.16 "Organizational Context" Building Ambidexterity Into an Organization, Birkinshaw and Gibson, 2004.

4.5.1 Methodology and results

The survey data was downloaded as summaries for each section and as a set of complete data (i.e. all responses of all respondents). From the first we can make a purely descriptive analysis of what are the results in the form of horizontal bar graphs.

First of all, it is fair to mention the elements that have been used in the survey, depending on the section, with their relative shortcodes. Starting from the Performance Management section we have:

- Challenging objectives are established (PM 1)
- Creative challenges are launched instead of restrictively defining tasks (PM 2)
- Some pressure is maintained on the staff (PM 3)
- Performance measures and business objectives are used to manage activities (PM 4)
- People in the company are held responsible for their own performance (PM 5)
- Incentives are used to reward and encourage the achievement of performance (PM 6)

- The divisions have both short-term and long-term objectives (5 years) (PM 7)

The Social Support contains:

- Training is an important topic for the company (SS 1)
- Decisions are taken across the board, involving all stakeholders (SS 2)
- Best working practices and methods are quickly replicated throughout the organization (SS 3)
- Error is seen as an opportunity to learn and not as something to be ashamed of (SS 4)
- Teams that study radical innovations are encouraged to expand their network of resources by drawing on the knowledge of all other colleagues (SS 5)
- People with different backgrounds or functions work together to support innovation (SS 6)
- In the last two years the company has been looking for innovative skills in areas of which it had no previous experience (SS 7)

Finally, the Characteristics of Middle/Senior Managers mentioned are:

- I believe that middle/senior managers are vigilant and able to seek and seize opportunities (CH 1)
- I believe that middle/senior managers collaborate with each other and facilitate the work of colleagues (CH2)
- I think middle/senior managers can be multitaskers (CH3)
- I believe that middle/senior managers can act as mediators (CH4)

For the first section, 112 responses were collected. As Figure 4.17 shows, there are no items above the 4 points. To get a reference we have calculated the average of the weighted averages of the scores, which is 3.03. In doing so we can at least distinguish those elements above and below this value.

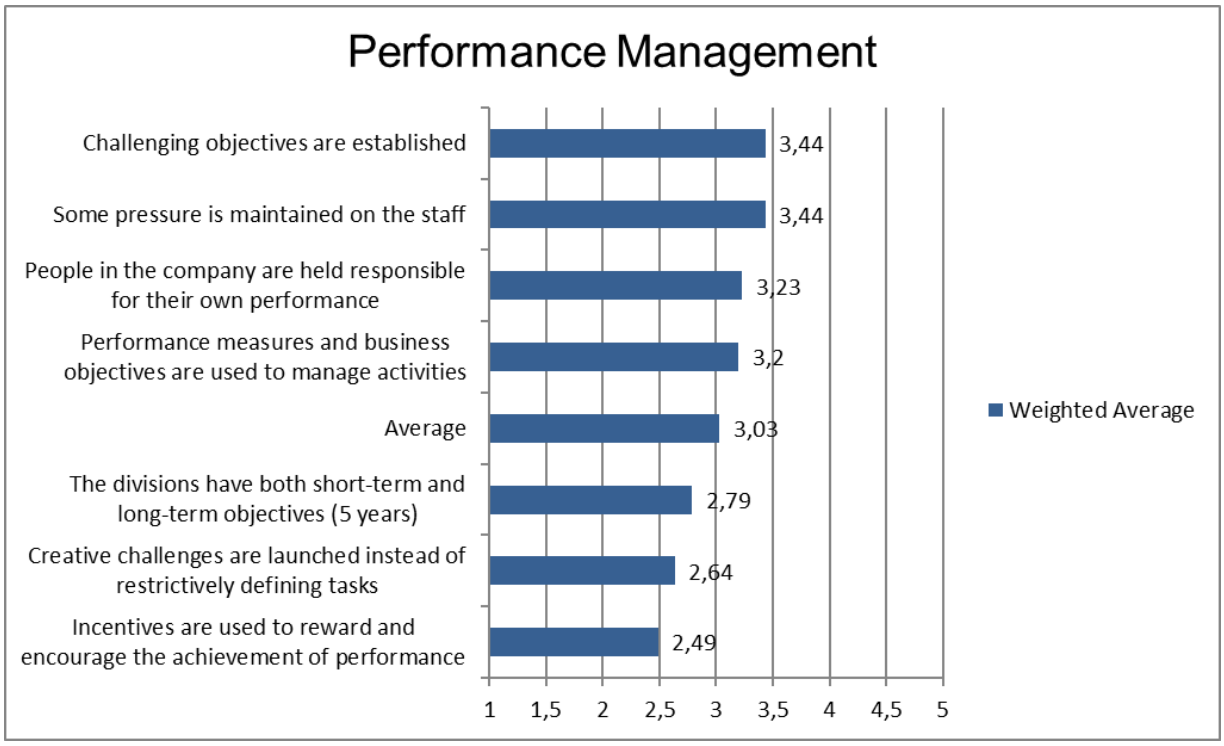


Figure 4.17 "Weighted averages of the performance management elements", own elaboration.

What emerges is that people in the company are held sufficiently responsible for their own performances. This is important, because creating awareness and responsibility in daily decisions and in certain project areas is a first small step towards more bottom-up approaches taking shape. Parallel to this concept, however, there is another interesting one regarding the vision of the group as a whole and in which people become responsible for the performance of the group itself, without personalizing successes or failures. This factor has not been considered either by me or by the authors on whom I have relied, but it could be an interesting starting point for further analysis.

Alongside this topic, it is noted that the management of activities through performance measures and objectives is also a factor that is developing in Alpha. On the part of TMT, in fact, there is a willingness to implement tools capable of assigning objective targets to people. This subject also opens a topic related to the possibilities of smart working. In fact, from the moment people are evaluated on goals and performances, the idea of work settled at certain times and in certain places may begin to disappear. This is because you are asked to reach a certain target within a certain time, beyond the means by which you get there. Also in this case, Alpha is quite a pioneer in this field

considering its sector. Since September 2019 the company has started a "smart working" pilot program.

On the same score are placed the fact that a certain pressure on the staff is maintained (and the meaning does not have to be negative), and the fact that challenging goals are set to the teams. The latter is also due to the fact that Alpha has always been an innovative company, which relies heavily on research and development and therefore maintains a high level of technological implementation in order to be a leader in the market.

The side of the creative challenges (second lowest score) is perhaps also justifiable by the nature of Alpha's business. The topic of incentives as a reward to the person (lowest score) is certainly something that will have to be evaluated and taken into account by the higher hierarchical levels.

For the second section, an average of 112 responses were also collected. The elements identified in Social Support are more critical for the company. The average drops below 3 points, as shown in Figure 4.18.

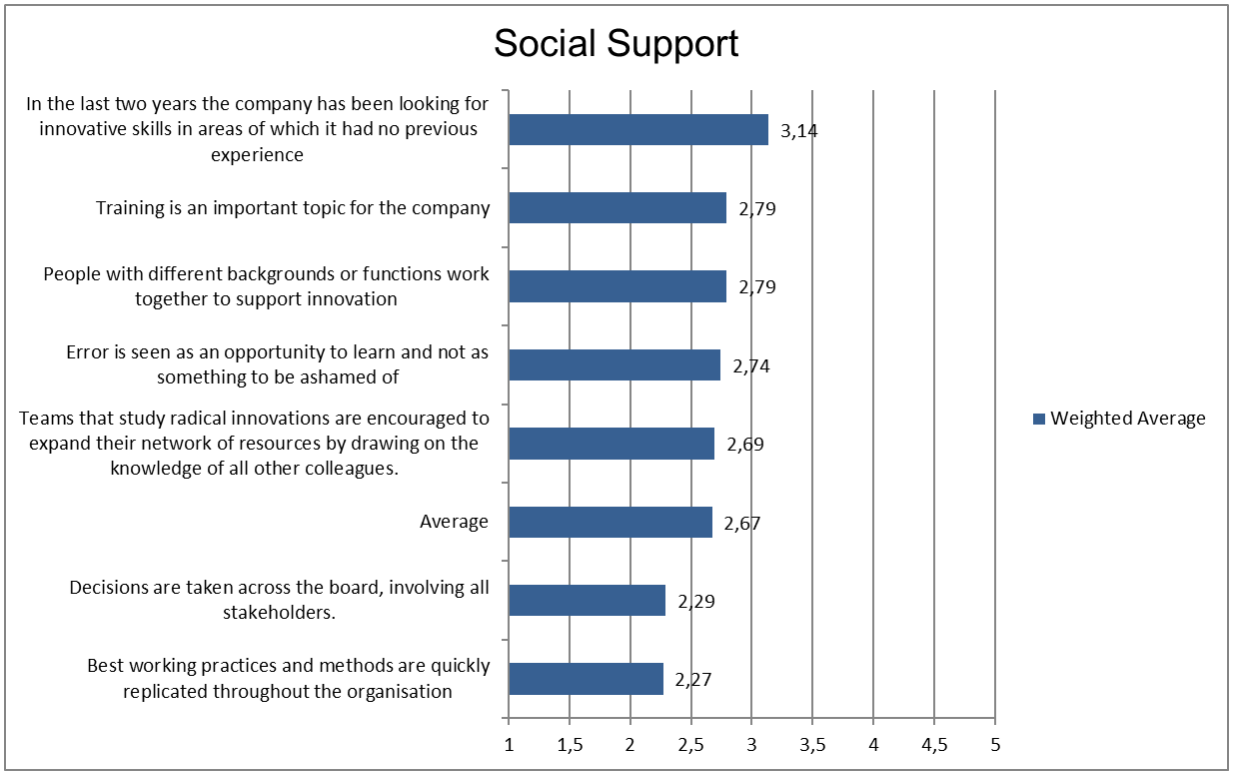


Figure 4.18 "Weighted averages of the social support elements", own elaboration.

The only element above the three points concerns having invested in resources with innovative skills of which there was no previous experience. Another element just above average is that teams dealing with radical innovations can draw on a variety of in-house skills. Regarding the training topic, the results were received before starting a training course on Office365. Ideally, by repeating the survey at the end of the year/beginning of 2020, the result could be partially improved.

Alpha will certainly have to think about two issues. The first is that the survey shows that employees think that decisions are only taken from the top levels. The second is that people believe that best practices are not replicated throughout the organization. Also in this case, it is possible that in the short period (a few months) the trend will change, because the tools within the Office365 package[17] will allow an improvement in communication and collaboration.

The third and last section, concerning the characteristics of middle and senior managers, was completed by 111 people. As can be seen from Figure 4.19, here, the answers tend more to the central value 3. It would not be strange if such a direct question about one's superiors led to not being too unbalanced in either direction.

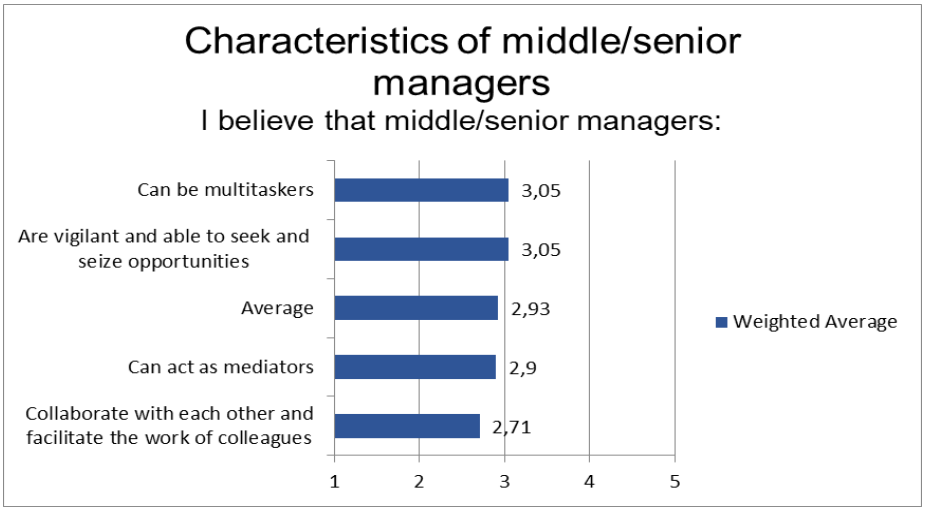


Figure 4.19 "Weighted averages of the characteristics of middle/senior managers elements", own elaboration.

These are perhaps the most subjective elements. In addition, they do not fit into the framework leading to the matrix developed by *Birkinshaw and Gibson* (2004).

[17] *The software package includes not only famous Office tools like Word, PowerPoint and Excel, but also Teams (similar to a chat, e.g. Slack), SharePoint, Planner, OneNote, etc.*

However, according to the respondents, managers are inclined to be multitaskers and are able to recognize and value opportunities that arise. This can also be explained by the seniority or experience that characterizes the managers in Alpha.

Following what has been done by *Birkinshaw and Gibson* (2004) we can insert in a Cartesian chart the average values of the two variables PM and SS to see where Alpha is positioned with respect to the four quadrants emerged from the analysis of the authors.

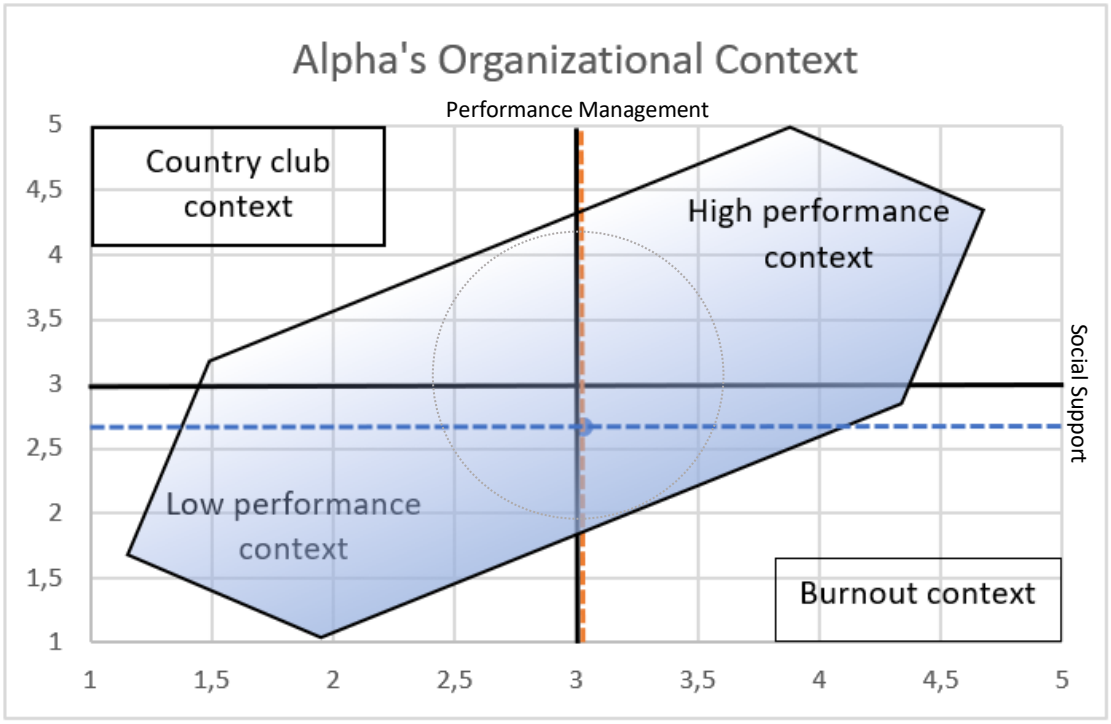


Figure 4.20 "Alpha's organizational context", own elaboration considering Birkinshaw and Gibson, 2004.

Considering, therefore, the two averages, we can see that we are minimally above the "low performance context" for the PM variable, while, considering the Social Support, we are in what is called Burnout Context. To be more precise, the crossing of the variables is in a middle area, closer to the diagonal of the axes, than to one of the four zones defined for the organizational context. Referring to the scheme of authors, we are in an average zone (light-grey circle).

From the total dataset we can do some analysis, although keeping in mind that we are evaluating Likert scales and that the population is limited to the company Alpha and, in particular, to those who responded to the survey. Maintaining separate the three sections, Performance Management (PM), Social Support (SS) and characteristics of middle/senior managers (CH), have been calculated average, mode, median, variance and standard deviation ("Analysing Likert Data", *Boone and Boone*, 2012).

Respectively,

- The averages are 3.03, 2.68 and 2.98
- The modes are 4.00, 2.00 and 3.00.

The median for these 5-point Likerts is 3.00. For the sake of completeness, standard deviations have also been calculated, which for a Likert scale can be limited to showing how much difference there was between respondents in evaluating the sentences. The deviations, which are nothing more than the square roots of the variances, are:

1.20, 1.15 and 1.08.

We can say that the answers vary by more than one point (+/- 1 from the respective averages). For performance management, the range is from 4 to 2 points. Assuming therefore, three normal curves, those of "Social Support" and "characteristics of the middle/senior management" would be found moved to the left with respect to that of "Performance Management".

	PM	SS	CH
Mean	3,03	2,68	2,93
Mode	4,00	2,00	3,00
Median	3,00	3,00	3,00
Variance	1,44	1,33	1,16
Std. Dev.	1,20	1,15	1,08

Table 4.8 "Data recap", own elaboration.

The second step was made considering both, papers regarding Likert scales, as well as the same paper by *Gibson and Birkinshaw* (2004). Although the questions of the authors were taken up and simply reworked, an analysis of the internal consistency of the questionnaire was made based on Cronbach's Alpha (*Gliem and Gliem*, 2003; *Hof*, 2012).

According to *Tavakol and Dennick*, 2011:

> Alpha was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency of a test or scale; it is expressed as a number between 0 and 1. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test.

A value generally chosen as the one above which there is internal consistency is 0.70. For this questionnaire the Cronbach's Alphas of all three sections (PM, SS and CH) were calculated. In order, the results were: 0.76, 0.87 and 0.91. For all the three sections, the internal consistency of the various items was observed, and it is, at least, acceptable. The high value of consistency reached by the third section is however influenced by the lower number of items that compose it (*Tavakol and Dennick*, 2011).

Given this difference and given the fact that the authors focus more on the other features, I preferred to continue the analysis on Performance Management and Social Support and keep the characteristics of middle/senior management as a possible element of subsequent comparisons.

To better understand if into the two sections there is homogeneity, or a sort of consensus (i.e. degree of agreement among raters), and following what has been done by the authors, the interrater agreements of each item of Performance Management and Social Support with r_{WG} have been calculated (*James et al*., 1984 and *Wagner et al*., 2010). Following the different authors (including *Glick*, 1985), the value of 0.60 (*) was maintained as a cut-off to define an acceptable interrater agreement. In particular:

Formula for r_{WG} establishing the interrater agreement

$$r_{WG} = 1 - \frac{s_x^2}{s_{mpv/m}^2}$$

Where $s^2_{mpv/m}$ is defined as[18]

(maximum possible variance)

$$s_{mpv/m}^2 = \frac{k[M(H+L) - M^2 - H \cdot L]}{(k-1)}$$

[18] s^2_x = observed rating variance; k = number of observed ratings; M = mean rating under maximum variance; H = highest rating on the scale; L = lowest rating on the scale.

The results (with: $S^2_{mpv/m}$ = 4,03604) were:

	PM 1	**PM 2**	**PM 3**	**PM 4**	**PM 5**	**PM 6**	**PM 7**
r_{WG}	0,65*	0,68*	0,75*	0,66*	0,71*	0,67*	0,58
	SS 1	**SS 2**	**SS 3**	**SS 4**	**SS 5**	**SS 6**	**SS 7**
	0,60	0,69*	0,76*	0,64*	0,73*	0,67*	0,72*

Table 4.9 "Interrater agreement values for each item of Performance Management and Social Support", own elaboration.

As can be seen from Table 4.9, the level of agreement among the raters is respected and acceptable for all elements, except PM 7 ("The divisions have both short-term and long-term objectives (5 years)") and SS 1 ("Training is an important topic for the company"). The medians of the PM and SS r_{WG} values are 0.67 and 0.69 respectively.

Being both slightly above the acceptance level and considering also the Interclass Correlation, that is 0.62 (calculated through a two-factor ANOVA without replication) we could see the two sections as an aggregate. The organizational context can therefore be seen as a single factor made up of Performance Management and Social Support, in turn structured on different characteristics.

For completeness of the analysis, the correlation between Performance Management and Social Support has been calculated with two methods, Pearson's r (*Wagner et al.*, 2010) and Spearman's correlation (*Norman*, 2010).

The results are extremely similar:

	Pearson's r	**Spearman's correlation**
Results	0.672	0.671

Again, confirming that there is a certain correlation between the elements defined within the two sections PM and SS and that the same respondents, with their answers have confirmed what was proposed by *Gibson and Birkinshaw* (2004).

It is possible to draw conclusions from this third survey by making some considerations.

The centrality of the results can certainly be due to the fact that the respondents, being quite sensitive issues, did not want to expose themselves too much; surely then, the organizational structure is perceived as still very vertical and in addition, as it results from the theory studied, proposing this kind of questions at lower "hierarchical" levels, the values go down a lot. Taking into account these biases and others that may not be mentioned now, the fact remains that the organization is evolving month after month, even in a substantial way, and that these answers can be useful to the HR of Alpha to make its own assessment and give the right weight to issues that perhaps, without this kind of research, may go unnoticed.

CONCLUSIONS

We can conclude the dissertation by analysing what are the most important results that emerged from the study of the company and what relationship there are with the theories set out in the first three chapters. The considerations we have made, have been developed in the light of the months spent in the company, during which I had the opportunity to interact with different people and participate in meetings and videocalls, also with customers and consulting companies.

We can start by saying that all the opportunities and challenges that arise at Alpha are closely related to the world of Industry 4.0. As we have seen in the first chapter, in fact, this project born in Germany in 2011 has developed and grown in step with what is known as the fourth industrial revolution, in which automation and cybernetic and digital interconnection systems are the masters. In a word, we can say that technological development has grown exponentially and, at the same time, the costs of developing certain products (sometimes even highly technological) have fallen dramatically. Commoditization is increasingly a phenomenon that affects all economic sectors (the Alpha's one too). Also for this reason, several governments help companies, through incentives, to invest in digital enabling technologies. Alpha, in this context, tends to be proactive. In fact, for about a year now, the company has been designing and fine-tuning a number of projects, all related to Industry 4.0. The Digital Transformation function was created to give a strong signal to the whole world and to say that Alpha is aware of the challenges that every day are posed to B2B manufacturing companies and knows what the path is to take to remain the successful company that has always been.

There are two main obstacles to overcome. The first is the strong competition from companies in developing countries, able to lower their fixed costs and then base their

strategies essentially on lower prices. The second obstacle is inherent to the company itself, and it is the fact that it is in a mature phase and, simplifying, we could say that there are two phases following this one: the first is that of decline, the second concerns the total renewal of the company and the subsequent restart from a phase of growth. From the choices made by the management it seems that the road they want to take is the second. It was not mentioned in the company description, but Alpha can be seen as an OES (original equipment supplier). The OESs, as much as the OEMs (original equipment manufacturers), with the digital transformation that the fourth industrial revolution brings with it, are always facing new challenges, to which they must necessarily respond quickly and effectively, otherwise it could occur the inability to keep up with the competition or with the demands of the customers, and therefore, the loss of the market. Not only challenges, however, but also opportunities. While on the one hand, the investments needed to adapt to technological changes are many and have a high impact on the company's accounts, on the other hand, these same investments could have very high returns. Elements that are part of the macro category of the Industrial Internet of Things such as equipment and platforms connected to the Internet and between them, can help the efficiency of production, as well as the time to market. The fields of application of IIoT are the most diverse, from production - and therefore monitoring and predictive maintenance - to supply chain management. These activities play a key role for OESs today. Having connected and highly technological plants, having CRM platforms, working effectively and efficiently, are all elements that can make the difference for the survival of the company in a world technologically more advanced and competitive. These same characteristics are also those that give the company the opportunity to bind closely with its customers (or with its suppliers), going over time to develop relationships that resemble more partnerships than purely transactional relationships. Alpha is located exactly in the centre of this "map" just described.

The company, in its short-term time horizon has as project the development of a process of servitization. In fact, it is aware of the increasingly important role that the offer of services has, especially in the world of B2B. Seeing the trends of this moment will not be a matter of years before the only way to stand out in an increasingly competitive landscape at the level of products, will be to offer unique and distinctive services that

can retain the customer. This will also be possible thanks to the skills and capabilities that are embedded in the company itself, which has always been a leader in its market and therefore has a high level of expertise. It is precisely this knowledge that could be used and offered to the customer. A fundamental element in this framework is the data and its analysis. In order to be able to offer a valuable service, Alpha must be able to store, analyse and process the data obtained both from its machines in production and from its products sold to OEMs. It will also be necessary to analyse the pros and cons of internalising or outsourcing services. In fact, it is not necessarily the case that Alpha has to develop the entire process of internal service-processing. The theories seen in chapter 2 show that there is no univocal "modus operandi", but rather, opinions are different. The process will not be so simple or linear either, as different challenges will be faced by Alpha. First of all, we will have to overcome the product-centric mindset, and this is perhaps the most complex challenge, as it involves the actors of the company. Changing the corporate mindset is not in fact an operation that can start without the willingness of people to approach this "new" world.

In reality, there are already some "ambassadors" in the company who have entered into the perspective of servitization and who want to "spread the message". Having to deal with people, ways of doing things, culture and routines is always a major challenge. Alpha has also begun a major investment process in OPEXs, capable of unhinging it from the dictates of the manufacturing sector where proprietary assets are the largest annual investments. Another challenge that Alpha should not underestimate is what Gebauer et al. (2005) defines as service paradox. In fact, it could be difficult (at least at the beginning) to have substantial revenues from services. In fact, even today the company, at least in small part, is carrying out its process of servitization (going to offer the customer services that only Alpha can give) but probably is not yet aware of the centrality of the role that this offer has, and therefore does not define the prices with which it could increase revenues. This confirms that the role of the "product" as a source of income is still rooted in the corporate character.

Alpha in its path could, at least, be able to offer services that have been defined as "Asset efficiency services", embedded services in products sold to OEMs that can improve the efficiency and productivity of itself. However, it is not excluded that the knowledge and innovative capabilities within the company may, in the future, lead it to offer so-

called "Process support services", services that would assist customers in improving their processes. This solution, although more complex, could give a turning point to the interested parties. It's all about the ability to bring out all the knowledge and skills within the company that could be useful to OEM customers, or why not, to other OES companies that could become a new kind of customer for Alpha.

Both the Industry 4.0 and digitalization elements as well as the servitization elements would actually modify and implement Alpha's Business Model. Even, to face all these challenges and changes, it could be more useful to create a new Business Model.

The question was whether the company was ready to respond to the challenges posed by the market, whether the necessary skills were already present in the company and to what extent, today, the IoT world had impacted on them. With this in mind, the questionnaires in chapter 4 were developed. From these, interesting points of view of the management and of the different actors of the company emerged. In fact, we first tried to reconstruct what could be Alpha's current Business Model, exploiting the structure of the Canvas Business Model. Then we created the first questionnaire to see if the management believes that the challenges that the company is approaching can impact on the business model so far carried out and if in the future there would be differences. What actually emerges is that the respondent management is aware of the strong role that the IoT will play in Alpha's future. They also realize that so far there has not been a strong technological impact on the elements of their Business Model, and this is fully understandable, as the company for just under a year is interfacing with the need and desire for this change. Some changes are already taking place, others are about to start. Among these we find the implementation of the staff, with the search for people with a strong sensitivity to these issues, as well as the implementation of the sales force. These elements are also being supported by the implementation of systems such as CRM, the connection of plants and the use of collaboration platforms. The blocks that are of fundamental importance for the company are reaffirmed to be the same mentioned by the authors presented in chapter 3. It is interesting to see how, despite being a manufacturing company, it rates as very important topics regarding value proposition or customer relations (topic that also emerge for fully IoT companies, for example). They are therefore aware that "partnerships", "co-development" and "network" are the key words be-

hind both the servitization and the renewal of the business model from an Industry 4.0 perspective.

But not all themes, probably, are clear. In fact, from the second questionnaire some important "food for thought" emerged. If on the one hand we have a management that is aware that to create a new business model based on IoT technologies you will have to acquire additional skills (perhaps not yet present in the company), on the other hand does not seem to be too clear the role that customers and distribution channels will have. If you think of differentiating your customer base, going in some way to reach, for example, the end customer (another important issue in terms of servitization and IoT offer), you will also need to rethink your distribution channels, which could hardly remain unchanged. It is difficult to think that an end customer (or even another kind of customer, such as the OES mentioned above) can be reached through the same channel through which you approach the OEM company. For the former, in fact, one should think with a B2C perspective, with all that this entails (banally, different types of marketing, different value propositions, different ways of approaching).

When talking about synergies, it is also necessary to talk about conflicts and risks that may emerge once you think you want to create a new business model. From this, it emerges that Alpha sees some possible risks as really having an impact on itself. These include internal risks, related to its own workforce and the organizational culture on which the company is based, and external risks related to its own value chain and the risk of no longer being the same as before. This last feeling can be justified by the fact that, like any successful B2B company, Alpha has created strong connections in its environment and on which perhaps time and effort have been spent to keep them alive over the years. This may explain the fear that such radical change could break these ties. Regarding the internal risk, the management should try to be ambassador of the message that this kind of change is useful to the company itself and will benefit everyone.

It was very interesting to compare the results of this second questionnaire with each other. It emerged that, applying purely theories of chapter 3, the management would see as feasible the integration in the future of a new business model capable of working in parallel with the traditional, while directly asking for an opinion on the location of this new BM the result changes, bringing out the will to separate it. This disagreement can

be explained by the fact that the management still does not have a clear vision of what this "potential" new business model could be, or it may be that they think that having synergies and few conflicts between business models, is not seen as a necessary consequence of the integration of the two, thus going “against” the theories of Markides and Charitou (2004). Obviously, this could be just a limited case, but it would be interesting to spread this "dual" research protocol to different companies to see what could emerge.
The disagreement could finally be explained by the fact that, not being the results too marked, maybe a compromise such as a temporary separation (or integration) could be the correct "modus operandi".
Returning the question to my supervisor, in fact, this point of view has re-emerged. A new business model that focuses on offering smart solutions based on IoT could in fact born as a stand-alone business (parallel to the traditional business), in which capabilities, know-how and resources are completely dedicated to the development of this business. Separating it, therefore, as a small start-up, could give it the freedom to grow without being oppressed by the culture and demands, as well as by the limits, practices and workload present in the main division.

The presence of ambidexterity within the company is then discussed. The picture that emerges is quite in line with the different results reported by the various questionnaires. If on the one hand, in fact, the characteristic of "alignment" (i.e. to remain all in line with the core business of the company) remains strong and preponderant (which can be normal for a manufacturing company B2B), on the other hand it confirms a certain predisposition to change and renewal. The values obtained from the item "adaptability" (that is, we want to remind, the ability to respond effectively to the challenges that arise) are not too low. Alpha may therefore be able to manage the challenges inherent in the world of IoT and servitization, and at the same time not lose the focus of its core business.

To respond to all these inputs that the digital world is offering, Alpha will need to implement its own organizational context. This is the basis for real change, and it has been studied that a strong organizational context can make a difference when you want to change or renew your business successfully. If on the one hand we have a management

that seems ready and determined to meet these challenges, with the third questionnaire emerged a substantial discrepancy with what is felt by the rest of the company population. Perhaps the image of the “old-style manufacturing company” has not yet been removed from the minds of employees, who see the so-called "social support" as an element to which Alpha does not yet given sufficient importance.

"From behind the scenes", however, I have seen how much work is being done on these issues, trying to implement collaborative platforms, training courses on their use, as well as increasingly topical issues such as smart working or the renewal of the environment and workspaces.

Managing all these activities at the same time is not easy and requires time and, above all, investments.

Whenever you approach the implementation of the theories studied and found in scientific research, you should always bear in mind that the reality is very complex, and it is the result of constant interactions, choices and compromises. Also the “simple” time for making decisions and starting activities can change a lot.

In a nutshell, we can say that the business world is changing radically and abruptly. It is therefore up to companies to decide whether they want to be part of this change, facing the challenges (and seizing the opportunities) that lie ahead or maintaining their "status quo", but at the risk of becoming obsolete.

The way is certainly not easy, and Alpha has to be aware that it may also need to course-correct its path as it faces the challenges, but the company has the ability and willingness to address change successfully.

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APPENDIX

7.1 First survey

(1=completely irrelevant; 2=irrelevant; 3=neutral; 4=relevant; 5=completely relevant)

Q1. Impact of technologies on aspects related to Alpha's customer relationships	Until now	In the next 3 years
Personal pre/post sales assistance (i.e. the customer can communicate - call, e-mail, ... - with a person during the sales process and after the purchase)		
Key account management (managing relationships with key customers)		
Co-creation (e.g. some companies turn to customers to assist them in designing new and innovative products)		
Customization of services (e.g. offering customers services such as predictive maintenance, data analysis, dedicated platforms)		
Q2. Impact of technologies on Alpha's ability to serve market segments	Until now	In the next 3 years
Intermediate customers (e.g. OEMs)		
Customer-end users		
Distributors/Installers		
Q3. Impact of technologies on the effectiveness of the Alpha's Value Proposition	Until now	In the next 3 years
Innovative services (Based on data collection, monitoring and analysis)		
Improve product performance		
Increasing proximity to the customer (e.g. developing relationships of collaboration over time, establishing relationships of trust, ...)		

Developing "services" as added value (i.e. moving away from a "product-centric" logic and offering solutions that include services)		
Q4. Impact of technologies on Alpha's sales channels	Until now	In the next 3 years
Indirect sales		
On-line sale		
Sales agents		
Q5. Impact of technologies on Alpha's revenue streams	Until now	In the next 3 years
Sales of products		
Usage fees (for software/platforms. e.g. following developments of Alpha Link and Alphaflame Connect)		
Customizations (i.e. customizations requested by the customer for specific product elements; e.g. customization of the Alpha Link interface)		
Spare parts		
Q6. Impact of technologies on Alpha's internal resource needs	Until now	In the next 3 years
Physical resources (equipment, installations, hardware systems)		
Human resources and know-how (understanding customer needs, technical knowledge, data analysis, problem solving)		
Financial resources		
Q7. Impact of technologies on Alpha's activities and operations	Until now	In the next 3 years
Factory production activities		
Platform maintenance/development activities		
Partner and supplier management		
Marketing and sales		
Customer service and support		
Q8. Impact of technologies on the need for partners to develop Alpha's products/services	Until now	In the next 3 years

Intermediate customers - OEMs - (with whom to develop products, improve through feedback, find new solutions, ...)		
Data analysts & Service partners		
Suppliers		
Q9. Impact of technologies on Alpha's costs	Until now	In the next 3 years
Personnel costs		
IT costs		
Product development costs		
Data analysis & Cloud computing costs		

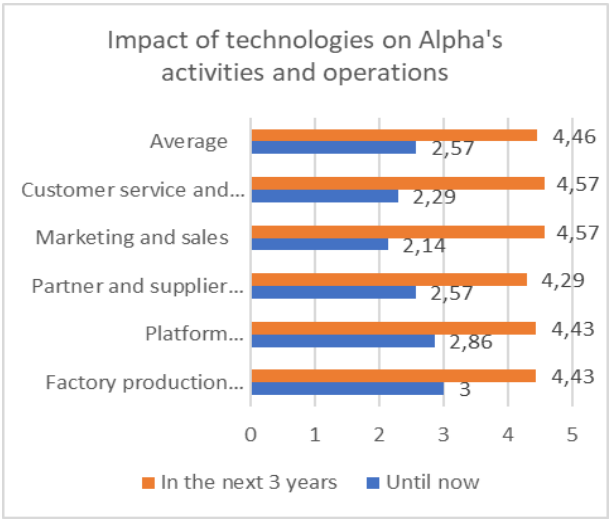
Strategic value of the Business Model Blocks for the Alpha's future	**1**	**2**	**3**	**4**	**5**
Key Partners					
Key Activities					
Key Resources & Capabilities					
Value Proposition					
Customer Relationships					
Customer Segments					
Channels					
Revenue Stream					
Cost Structure					

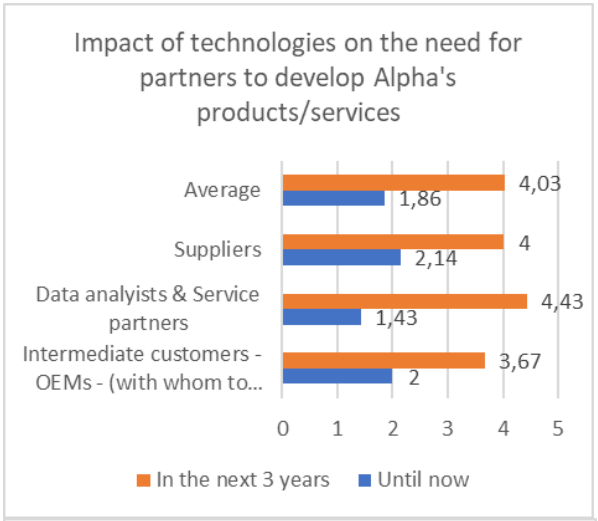
Inter-quartile ranges (IQR) of each item.

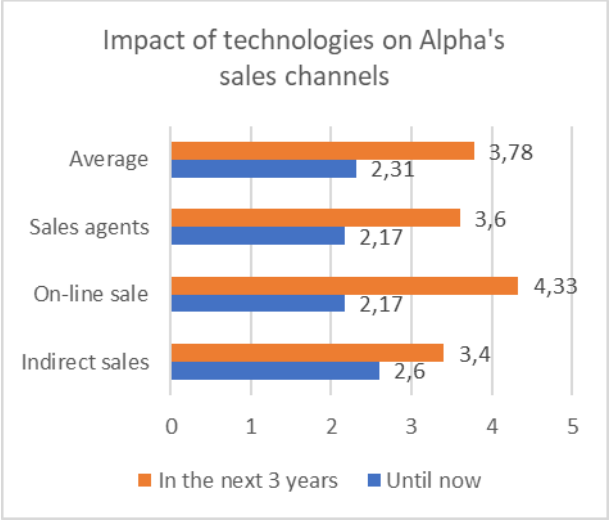
	Items	**IQR**
1	Personal pre/post sales assistance (i.e. the customer can communicate - call, e-mail, ... - with a person during the sales process and after the purchase)	2
2	Key account management (managing relationships with key customers)	3
3	Co-creation (e.g. some companies turn to customers to assist them in designing new and innovative products)	1
4	Customization of services (e.g. offering customers services such as predictive maintenance, data analysis, dedicated platforms)	3
5	Intermediate customers (e.g. OEMs)	2
6	Customer-end users	3
7	Distributors/Installers	3
8	Innovative services (Based on data collection, monitoring and analysis)	2

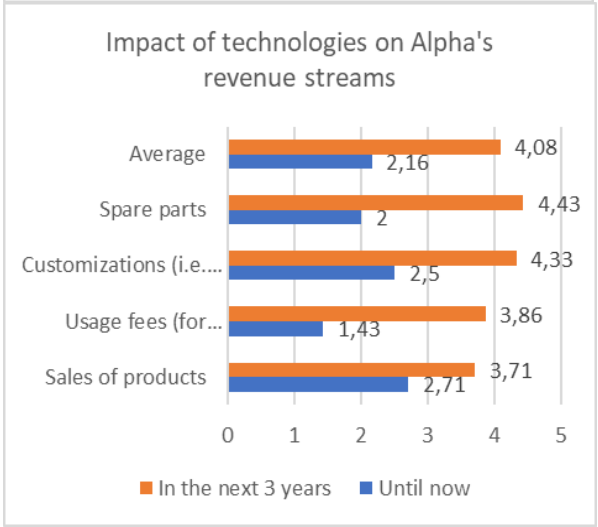
9	Improve product performance	2
10	Increasing proximity to the customer (e.g. developing relationships of collaboration over time, establishing relationships of trust, ...)	2
11	Developing "services" as added value (i.e. moving away from a "product-centric" logic and offering solutions that include services)	2
12	Indirect sales	1.5
13	On-line sale	2.5
14	Sales agents	2.25
15	Sales of products	3
16	Usage fees (for software/platforms. e.g. following developments of Alpha Link and Alphaflame Connect)	1
17	Customizations (i.e. customizations requested by the customer for specific product elements; e.g. customization of the Alpha Link interface)	1.5
18	Spare parts	2
19	Physical resources (equipment, installations, hardware systems)	2
20	Human resources and know-how (understanding customer needs, technical knowledge, data analysis, problem solving)	2
21	Financial resources	1.5
22	Factory production activities	2
23	Platform maintenance/development activities	2
24	Partner and supplier management	2
25	Marketing and sales	1
26	Customer service and support	1
27	Intermediate customers - OEMs - (with whom to develop products, improve through feedback, find new solutions, ...)	2.25
28	Data analysts & Service partners	1
29	Suppliers	1
30	Personnel costs	3
31	IT costs	1.25
32	Product development costs	1
33	Data analysis & Cloud computing costs	1

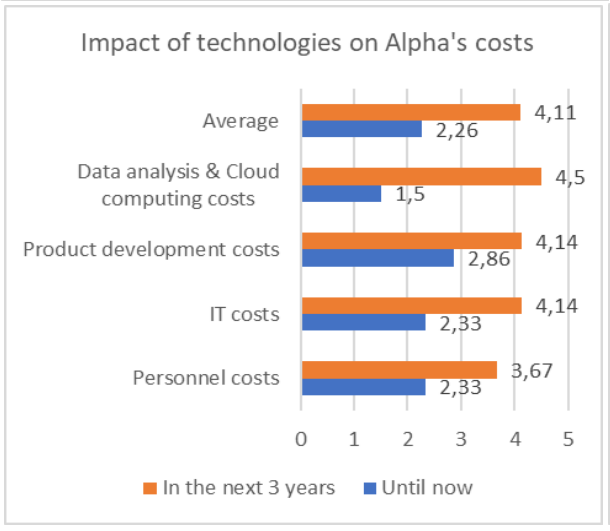
Weighted average of each element of the blocks ("until now" and "in the next 3 years")

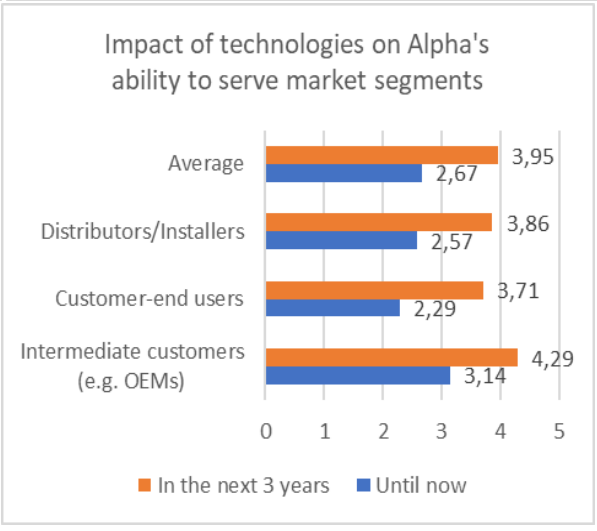












7.2 Second survey

(1=completely disagree; 2=disagree; 3=neutral; 4=agree; 5=completely agree)

Synergies between the new business and the original one. The new Business Model will be able to exploit Alpha's current resources and skills, specifically	**1**	**2**	**3**	**4**	**5**
Capabilities					
Customers					
Hardware and Software Resources					
Distribution Channels					

Possible conflicts between a new Business Model and the traditional one. Risks of:	**1**	**2**	**3**	**4**	**5**
Compromising the quality of service offered to customers					
Diminishing the company's image or reputation and the value associated with it					
Shifting customers from high value to low profit margin assets					
Cannibalizing the existing customer base					
Adding activities that confuse the customer about the company's priorities and incentives					
Destroying or diminishing the value of the existing distribution network					
Adding activities that confuse the worker about the company's priorities and incentives					
Loss of organizational focus in trying to do "everything for everyone"					
Destroying the overall organisational culture					

How should the Innovative Business Model – focused on the development of smart solutions – be managed from an organizational point of view?	**1**	**2**	**3**	**4**	**5**
Independent company with its own brand and balance sheet					
Internal division with own budget					
Office without a specific budget					
No organizational separation					

7.2.1 Ambidexterity survey

Level of management alignment	**1**	**2**	**3**	**4**	**5**
Management is able to direct company resources towards activities that prove to be productive					
The objectives set by the management are well defined and do not lead to the overlapping of roles					
The organisation's management works consistently to support the company's objectives					
Level of management adaptability	**1**	**2**	**3**	**4**	**5**
The company organization is able to evolve rapidly according to the priorities that emerge					
Management is flexible enough to respond quickly to market changes					
Management encourages the renewal of company practices and habits					

7.3 Third survey

"Evaluation of Alpha organizational context:"
(1=completely disagree; 2=disagree; 3=neutral; 4=agree; 5=completely agree)

Performance Management	**1**	**2**	**3**	**4**	**5**
Incentives are used to reward and encourage the achievement of performance					
Creative challenges are launched instead of restrictively defining tasks					
The divisions have both short-term and long-term objectives (5 years)					
Performance measures and business objectives are used to manage activities					
People in the company are held responsible for their own performance					
Some pressure is maintained on the staff					
Challenging objectives are established					
Social Support	**1**	**2**	**3**	**4**	**5**
Training is an important topic for the company					
Decisions are taken across the board, involving all stakeholders.					
Best working practices and methods are quickly replicated throughout the organisation					

Error is seen as an opportunity to learn and not as something to be ashamed of					
Teams that study radical innovations are encouraged to expand their network of resources by drawing on the knowledge of all other colleagues.					
People with different backgrounds or functions work together to support innovation					
In the last two years the company has been looking for innovative skills in areas of which it had no previous experience					

Characteristics of middle/senior managers	**1**	**2**	**3**	**4**	**5**
I believe that middle/senior managers are vigilant and able to seek and seize opportunities					
I believe that middle/senior managers collaborate with each other and facilitate the work of colleagues					
I think middle/senior managers can be multitaskers.					
I believe that middle/senior managers can act as mediators					