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Tesi di laurea

L'IMPATTO DELLA DIGITALIZATION SULLE STRATEGIE DI MARKETING: EVIDENZE EMPIRICHE IN AZIENDE BtoB E BtoC

THE IMPACT OF DIGITALIZATION ON MARKETING STRATEGIES: EMPIRICAL EVIDENCE IN BtoB AND BtoC FIRMS

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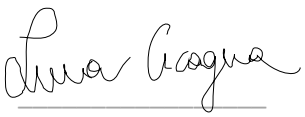


Abstract – Italiano

La nostra era è stata caratterizzata da un grande avanzamento tecnologico e digitale che tutt'ora modifica e impatta sulla società e sull'economia. Le imprese si trovano ad affrontare grandi cambiamenti e ad implementare nuove tecnologie per migliorare il business e le performance. Questo processo si riconosce sotto il nome di *trasformazione digitale* e comprende una serie di cambiamenti organizzativi interni all'azienda, ricerca di nuove skills e investimenti in tecnologie digitali sempre più all'avanguardia. Una di queste in particolare, l'*Internet of Things* – IoT, sta riscuotendo sempre più interesse tra aziende e studiosi, date le sue grandi potenzialità d'utilizzo e benefici sia per imprese che persone. In questo elaborato ci si pone l'obiettivo di analizzare gli impatti che la trasformazione digitale, e in particolare l'IoT, stanno avendo sui rapporti tra impresa e il suo mercato. Distinguendo tra mercati BtoB e BtoC, si è approfondita l'evoluzione delle strategie di marketing e quali aree in particolare stiano beneficiando dall'implementazione di soluzioni IoT e raccolta dati. A riguardo sono state formulate sei ipotesi, supportate dalla letteratura e da dimostrare attraverso evidenze empiriche – casi studio. Il risultato della ricerca ha evidenziato sia conseguenze indirette, che coinvolgono l'impresa in senso più generale, sia dirette. Le prime riguardano i cambiamenti radicali nell'organizzazione interna e nella cultura di business, inevitabili per implementare con successo soluzioni IoT. Gli impatti più diretti riguardano invece due aree strategiche del marketing in particolare, che stanno ottenendo benefici e migliori risultati: il *customer engagement* – r*elationship* e lo sviluppo di strategie legate a servizi digitali e non – *servitization e digital servitization*.

Abstract – English

Our era is characterized by a great digital and technological disruption that is changing both the social and economic landscape. Firms have to implement new business strategies, technologies and skills to remain competitive. This process of evolution is known under the heading of *digital transformation* which encompasses internal and organizational changes for firms, the implementation of new skills, new digital technologies and capabilities. One of the most promising among these technologies is the Internet of Things – IoT, which is gaining additional interest from businesses and academic researchers, due to its great opportunities for both firms and people. With our work, we aim to analyze the main impacts that the digital transformation, and the IoT as part of it, are having on the relationship between the firm and its market. Making a distinction between BtoB and BtoC markets, we have studied how the marketing strategies have been changed by the IoT and data analysis. Capitalizing on a literature review, we have formulated six propositions related to our research question, involving both direct and indirect impacts of the IoT on marketing. These hypotheses have been proved with some empirical case studies. The indirect consequences are referred to the organizational and cultural changes which are inevitable for a successful adoption of IoT solutions. While the direct changes are related to two marketing areas in particular: the *customer engagement/relationship* and the *servitization and digital servitization*, which benefit the most from IoT implementation as suggested by the case-study analysis.

Content

Introduction

The technological disruption and progressive digitalization are characterizing our era, leading to fast and continuous changes both in the social and economic landscape. This is pushing the competitive pressure for organizations, which, to remain competitive in the new digital markets, need to face a process of *digital transformation* that is impacting the overall firm's strategy and internal organization. Entering the digital landscape requires a change in the *culture* and a re-alignment of strategies and internal functions. Everything starts with Big Data and the new digital technologies part of the digital transformation. In particular, one of the most promising technology is known as the Internet of Things (IoT), which are essentially *smart devices*, connected through the Internet and able to communicate with other objects and/or humans. The potentiality of this technology is in the ability to collect and transmit data, related both to the sensor product and who is using it.

The aim of our discussion is to analyze the process of digitalization firms are embracing and in particular how it is impacting on the relationship between the firm and its market. Thus, through our analysis, we aim to understand how the *marketing strategies* of firms are changing, considering both the business and consumer markets. In detail, we will look at the impacts generated by the IoT technology as a very prominent solution which is gaining even more interest in current days. Thus, our discussion is organized along three chapters.

In the *first chapter*, we introduce the concept of *digital transformation* (DT) and what it means for firms, what is changing and the benefits – challenges it poses. This process encompasses a series of new digital technologies which are gaining increasing attention among businesses and academics due to the potentialities and opportunities brought by them. We will go through these technologies, categorized into four main groups: embedded analytical systems - Big Data; virtualization systems - Cloud computing; mobility systems - the Internet of Things (IoT); machine intelligence systems - Artificial Intelligence (AI). The process of digital transformation requires not only the adoption of advanced technologies and capable skills. It is a complex and innovative change which involves the overall organization. Firms have to rethink their business strategy to be more proactive and to create internal synergies among all the functions and activities. Thus, the Digital Business strategy is the new outer reach to implement to be successful in the digital landscape. Even more intensively, the adoption of this strategy along with a process of digitalization is giving firms more interest into the service and digital service strategies.

All the firm functions are affected by the process of digital and technological disruption. The focus of our discussion will be on how these changes are impacting the relationship between the firm and its market. Thus, in the *second chapter* we going through the development path of marketing strategies, from yesterday to nowadays. In order to understand which are the main changes brought by the digitalization and the new technologies on the marketing function, we start analyzing the marketing though from its formalization as a discipline, roughly one century ago. This introduces us to several important concepts, like which are considered the fathers of the modern marketing, the dichotomy present in the literature between BtoB and BtoC marketing strategies, and so on. These are the basis to understand how the marketing strategy is changing today, which are the new opportunities and challenges posed by the digital transformation, also making a distinction in BtoB and BtoC markets and studying if this dichotomy can be supported in current days. We will define two main areas where the technological and digital disruption is improving the marketing potentials: the *customer engagement and relationship area* and the *servitization, including the digital servitization area*.

The last part of our work is focused on one promising technology, part of the DT, which is gaining even more attention in businesses and academic researches: the Internet of Things. We have decided to focus on the Internet of Things because, currently, its potential is enormous and firms have to evaluate both threats and opportunities before to dive into these solutions. The IoT technology can be applied in several fields and sectors, such as in the *Smart Industry – Industry 4.0*, in the smart home or city, in the automotive sector, in the healthcare and in the social/personal domains. After a deeper description of this technology, we analyze the related challenges and opportunities to be evaluated by firms. Thus, capitalizing on the literature and studies reported in the last part of chapter two and in chapter three, we will formulate our own hypotheses on which impacts the Internet of Things is generating on the marketing strategy of both B2B and B2C firms. We aim to present some propositions which will be proved along with some empirical case studies. These cases will be selected among firms actually involved in IoT-related activities, mainly from north-east Italy but internationally based, in order to study and analyze the truth of our assumptions.

Chapter 1

The *Digital Transformation* of Firms: the impacts of new digital technologies

1.1 Introduction

Our era is evolving around a great digital and technological improvement that is challenging industries and the way of doing business. One relevant change is related to the industrial process and production. Businesses are living a new industrial revolution, the Fourth one, known as *Industry 4.0*. With the *Industry 4*.0, the aim is to integrate the ICT (*information and communication technologies*) with the industrial technology (Zhou *et al*., 2015) in order to reach a more flexible, information-led and sustainable production. The technological disruption affects not only the manufacturing system. It also changes the organization, strategies, key capabilities required, cultures, value proposition and so on, which need to be re-aligned and implemented by companies. This process of firms' transformation is known under the label of *Digital Transformation* (DT) and it represents both challenges and great opportunities for organizations.

In this chapter, we explain the meaning of digital transformation for firms, what is changing, the main challenges and opportunities. Then, we present an overview of the main digital technologies part of the DT, which are receiving additional attention by businesses for their strategic potential. At the end, we will explain where the digital transformation is leading firms, introducing the concepts of digital business strategy and digital servitization.

1.2 The Digital Transformation and main impacts on firms

1.2.1 The organizational changes brought by the Digital Transformation

Our era is characterized by very high-speed changes, regarding a lot of aspects of society, customer life and behaviour, business landscape and competition. The main responsible for that is the technological revolution which is taking place even more rapidly. The introduction of the Internet Protocol (IP) represents a turning point that gives the chance to all people and companies around the world to be connected and do things incredible for humans living just a few years ago. The progresses in the technological field are going fast and companies need to be at the avant-garde. For this reason, the *digital transformation* (DT) is one main concern for businesses to remain competitive in their industries and be able to strengthen the relationship with customers, who are also changing their approach to how buying, get informed and behave with firms. As the world is turning to a digit-based one, companies must do the same.

The process is easier said than done and needs proactive employees with a strong vision about what technological transformation means for their culture and business approach.

According to a survey (2013) conducted by MIT Sloan Management Review and Capgemini Consulting, that involved 1.559 executives and managers in a wide range of industries, respondents believe in the power of technology in changing their business but they also feel frustrated about how hard is to get results from the technological deployment. More than 75% of interviewees know the digital transformation represents a critical objective now and in the near future and 81 percent declares to have already entered the adoption stage, trying to achieve DT. Companies investing in new technologies and managing them in the right way are at the edge respect to their main competitors and can expect to gain in one or more of these three areas (Fitzgerald *et al.*, 2013):

- Improvement of customer experience and engagement;
- Transformation of operational processes;
- Changing the business model.

The first area regards customers' experience and engagement. It refers to how companies can exploit the potential of new technologies to enhance and strengthen their relationship with customers. The aim is to retain present clients but also to get new ones, which is exactly the concept of *engagement*. The digitalization is changing the ways and strategies to achieve the customer engagement and satisfaction, arriving at the concept of *customer experience* that is more appealing to a B2C context. This will be treated more in detail in the following chapters as the core of our analysis. We can have a brief idea considering the consumer market case as the most immediate: the widespread use of the Internet, social media and connected devices has increased the share of customer-specific data flowing to firms. In this way, organizations are more informed about individual customers' needs, purchase history, preferences and so on, and are starting to create more user/customer-friendly products and services which can be even more customized. Data are an invaluable source to exploit for enhancing the customer engagement strategy. Everything can be customized to satisfy the needs of each client and to augment their user experience. The businesses are definitely moving from product to consumer-centric as a result of DT.

Second, also the operations are being improved with the digital disruption. The first change occurs in the digitalization and automation of business processes, as the core of *Industry 4.0*. Additionally, the digital transformation of internal processes has made more fluent and easier the internal communication and the share of innovative ideas. For this reason, the

performance of managers is also doing better, as they have more real-time information and data. This has improved the decision-making process, that is no longer based only on assumptions but is supported by a more comprehensive and synergic vision of the company. Putting together these changing aspects open the way to different businesses and market opportunities, where firms can operate, creating new products and services. The digital transformation is leading to innovative ways of doing business that will be more digital: traditional products are surrounded by digital elements or services or digital products are added to complement traditional ones (Sánchez-Montesinos *et al.*, 2018; Loonam *et al.*, 2018).

Finally, the last point impacted by the process of digital transformation is the development of a new *business model*. Business models (BM) can be defined as:

[...] "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 *et al.*, 2005, p. 10; Wittel & Löfgren, 2013).

According to the cited definition, the business model should explain how a company is able to realize profits and create and capture value within the surrounding environment. Traditional business models are generally product-based and, as regards what we have reported beforehand, it is easy to understand the necessity for a reshape of traditional ones. The reasons are in the disruptive change brought by digital technologies and in the new role digital (and no) services are increasingly having in the present and future scenarios. The concept arising from is the Business Model Innovation (BMI). This model has the ability to add other questions for businesses, related to how leveraging opportunities coming from innovative and technological progress. This is in order to find new ways to create and capture value, to generate revenues, to determine new value propositions and reformulate the relation with customers, partners and suppliers (Sánchez-Montesinos *et al.* 2018).

The positive impacts of a digital transformation may be easier to achieve by "born digital" firms if compared to the traditional behemoth firms, which had dominated their markets since the advent of the technological revolution and digital era. These big old companies need to rethink their business approach and strategy, to reposition themselves and remain competitive (Sebastian *et al.*, 2017).

1.2.2 The Digital Transformation for “old” traditional companies

The greater effort and concern in the digital transition is for “old” traditional companies which, to stay competitive, have to reshape their way of working and what surrounds it. They are investing in new technologies and new capabilities to reposition themselves as digital leaders (Sebastian *et al.,* 2017), but the more international and big they are the more challenging can be the DT. To be successful, big old companies in particular, need two elements for facing their digital transformation: a *strong operational backbone* and a *digital service platform*. According to a survey conducted by Sebastian *et al.* (2017) on 25 large successful companies initiating a DT, before to choose which digital strategy to implement, is essential to have a consolidate operational backbone, intended as “the technology and business capabilities that ensure the efficiency, scalability, reliability, quality and predictability of core operations” (Sebastian *et al.,* 2017). Only this element enables to support the selected digital strategy: the survey reveals those companies without an operational excellence have fewer chances to survive to the transition because of a lack in seamless operations and capabilities required. The meaning of this excellence has to be found in the integration of all functions in order to create a synergy inside the firm and among all workers and responsible for any process. Managers need to know how the previous and next functions in the process are working and on which information they are making decisions. To consolidate this argument we can take as an example the LEGO case. LEGO saw a huge problem in delivering rapidly and cost-efficiently their products to retailers because of a lack of controls around the supply chain. By implementing an ERP system and then following programs to standardized other related processes, LEGO was able to create the excellence in its operations (Sebastian *et al.,* 2017).

Anyway, operational excellence is necessary but not sufficient to execute an effective digital transition: a digital service platform is also needed, defined as “the technology and business capabilities that facilitate rapid development and implementation of digital innovations.” (Sebastian *et al.,* 2017). A digital service platform as intended here serves to be more fluent and rapid in finding and putting into work new digital opportunities. It is generally composed by (Sebastian *et al.,* 2017):

1. Digital components that allow different business and technical services;
2. A cloud computing system;
3. A good storage capacity to manage with knowledge data coming from all possible sources (public sources such as social media data, sensor data etc);

4. Analytical skills to convert data into insights;
5. Connection with data and processes of the company backbone.

Continuing with the LEGO example, the company has developed a digital service platform that, within all the company functions, creates the chance for LEGO to collaborate in real time with partners on a joint product, or to give those partners the access to LEGO functionalities. That is a way also to improve the relationship with clients and partners in the supply chain, not only with customers.

The Operational backbone and Digital service platform are complementary and tied one to the other, assuring a better basis to start a digital strategy. With the technological revolution, big old companies are in front of the necessity to transform in digital businesses. By being a proactive part of this digital environment, they can reinforce their business and face new customer expectations, new and younger competitors, maybe digital-born with a better knowledge of digital and its opportunities. They can implement revolutionary managerial approaches (Sebastian *et al.*, 2017) and remain competitive.

The necessity to build up a strong technological infrastructure and the ability to manage with all the new digital technologies is not a sole concern of old big organizations. All companies involved in a digital transformation need to know the opportunities and risks brought by the digital and technological disruption. As part of this transformation, a series of new digital technologies are coming to the edge.

1.3 The new digital technologies under the heading of Digital Transformation

The process of digital transformation firms are facing to remain competitive in the new economic environment, encompasses a strong technological revolution. A series of new digital technologies are at the forefront for organizations with great opportunities to enhance the business performance and going through the digital transition. These main new technologies can be clustered into three groups (Loonam *et al.*, 2018):

1. embedded analytical systems, for example Big Data;
2. virtualization systems, such as Cloud Computing;
3. mobility systems, like Internet of Things (IoT);

In our opinion, the classification is to enlarge considering the phenomena of Artificial Intelligence (AI), which is changing the economic landscape with big opportunities for firms as well. A fourth group can be added:

4. Machine intelligence systems, such as Artificial Intelligence (AI).

Within the first system of embedded analytics, we will focus on the *Big Data* revolution which, in our opinion, can be considered the starting point of the digital transformation. Currently, firms are dealing with a landscape overwhelmed by a huge amount of *data* and are learning how to exploit the potential coming from them. The birth of computers and the introduction of the Internet protocol (IP) have changed the world, including the organizations and the landscape around them, creating the basis for the creation and deployment of an ever-increasing amount of data. As a result, organizations have to face and learn how to manage the *Big Data* and their disruptive potential.

1.3.1 The Big Data revolution: the "Vs"

Big data is a new term used firstly by big companies such as Google or Facebook to give means of a large amount of data flowing to and from them. Data exist since the creation of computers and start increasing their volume considerably with the technological improvement, the new (mobile) devices and network at our disposal. It has been estimated that the amount of data is increasing exponentially, with an increase of nine times within the last five years, and they probably will duplicate year by year (Chen & Zhang, 2014). Big Data were usually defined through the so-called "three Vs", which stand for: *Volume, Velocity, Variety.* Following the "Vs" model, other consistent definitions have been added later, becoming well recognized as well: *Veracity*, added by IBM and Microsoft, and *Value*, added by McKinsey and Co (Yaqoob *et al.,* 2016; Chen *et al.*, 2014).

Volume is the primary characteristic of big data and refers to the great increase in the amount of available data produced day by day. The measured size has slipped from petabytes to zettabytes; so, considering that one petabyte is one million of gigabytes, a zettabyte sounds something enormous. *Velocity* refers to the relentless rapidity of data creation, while *Variety* is related to the different sources and types of data (Erevelles *et al.*, 2015). For the two additional Vs in defining big data, *Veracity* reflects the necessity to pay attention to data and their reliability and quality, while *Value* is an important feature, in particular, considering the volume and how this is ever-increasing. The need is in defining the relevant data that can be useful in terms of analysis and objective for a specific research.

Big Data is a large phenomenon which is changing radically firms and business strategies. Their potential is huge, along with several challenges that can represent a barrier for firms. Currently, managing with Big Data requires advanced technologies, techniques and

professional figures. But the initial applications of Big Data were so different from the current ones. A brief overview of the big data application genesis can be useful to understand the conceptual foundation, vision and trend of big data (Yaqoob *et al*, 2016).

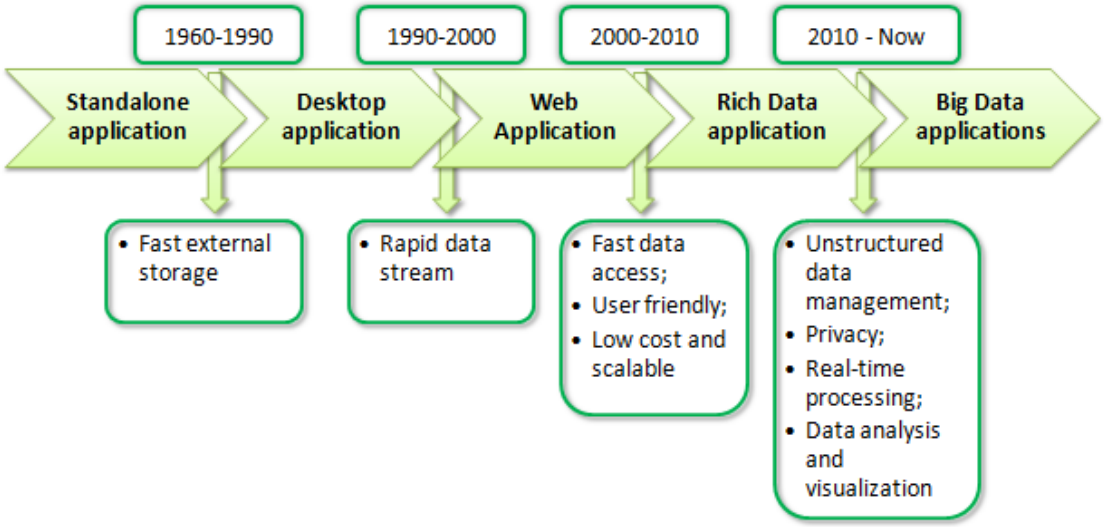
1.3.1.1 Big Data applications (BDA) and sources

The reasons for data storage, organization and analysis have changed as the technological setting and the data themselves have become different and more complex over time. Basically, we can identify four major big data application (BDA) models: Standalone, Desktop, the Web and Rich Internet Application (Yaqoob *et al*, 2016).

During the 20th century, the main concern was doing rapid computations and storing internally the data. These requirements encompass in the *standalone application*. The necessity for a larger and also external storage capacity led to the subsequent model of *desktop applications*, like the instant messaging, where we have standalone applications running on a computer without internet connection. With the development of the Internet Protocol (IP), the new model used in big data application was the *web one*, such as Google Docs. As new needs and requirements are stressed, like a faster data access or lower costs along with a better scalability, the *Rich Internet Applications* were developed. They merger the desktop and web features (Yaqoob *et al*, 2016), leading to a structure with useful functionality and rapidity in generating and storing data. Currently, this application model is not able to deal with an ever-increasing amount of data. New sources, such as smartphones, connected devices and similar technologies, along with new customer necessities, are challenging the application models. New digital data come to be heterogeneous, unstructured and of different types. They cannot be managed and analyzed with traditional database (Yaqoob *et al*, 2016) and, for these reasons, the management of big data applications is a challenging task to solve. Currently, the development of cloud platforms and related services may be the solution for Big Data management and mining, as we will stress in the next section about *Cloud computing* technology.

The evolution of BDAs is described in Figure 1, where at the top we have the time periods and, in the lower part, the main reasons which have led to the improvement and change in big data application models.

Figure 1**:** Genesis of Big Data applications (source: Yaqoob *et al*, 2016)



As anticipated above, the digital transformation of firms and the increasing digitalization of people's life, have pushed the generation of data and of the available sources. But, what about these sources?

Without the presumption to be complete now, as in the next chapter we will treat in depth the argument, we can define and cluster the main sources of Big Data, which are: the Internet of Things (IoT), self-quantified, multimedia and social media sources (Yaqoob *et al.*, 2016).

IoTs are smart and intelligent devices connected through Bluetooth or wireless technology and able to communicate with other objects, humans and firms. IoT represents a prominent technology and its potential is recognized from a vast wide range of industries (Lee & Lee, 2015). This is a huge world as the type of connected things and the sectors of application are various and heterogeneous. Examples of IoT devices may be the smartphones, sensors applied to home appliances or to home systems to remotely control the temperature or the windows, the sunblind, and so on. We will analyze deeper the Internet of Things in a following section of this chapter (see *infra* §1.1.3).

Self-quantified sources of data are generated by monitoring personal behaviour (Yaqoob *et al.*, 2016). An example is a mobile app that keeps tracks of your path, cardio or movements. Then, we have multimedia data coming from text, imagines, videos and similar. The last source is probably the most common and intuitive: social media data, which are generated by YouTube, Facebook, LinkedIn, Instagram and other social indeed (Yaqoob *et al.*, 2016).

1.3.1.2 Big data challenges for firms

As we have analyzed in the previous paragraph, big data applications evolve over time because of the change in needs, technology, complexity and amount of data generated, which need to be managed in a useful way. The last point introduces a series of *challenges* firms have to face when investing in Big Data technology. In particular, we have identified three major concerns, which are related to:

- The financial effort (Yaqoob *et al.*, 2016);
- The lack of professional figures with expertise in the field (Rowe, 2017; Erevelles *et al.*,2016; Pearson & Wegener, 2013);
- Change towards a Big Data or, more generally, a Digital culture (Shaughnessy, 2018; Kane *at al.*,*2017*).

Organizations can gain important insights from data, but a strong technological infrastructure is fundamental to build and deal with the Big Data value chain (Curry *et al.*, 2016; Chen *et al.*, 2014; Miller & Mork, 2013). This chain is composed of different stages, from data generation (related to the sources) to data acquisition, storage and analysis (Chen *et al.*,2014). Each phase requires specific techniques and technologies. This means irremediably *costs* and *investments* that probably will come to show their return only later, not in the short run. Thus, the **financial effort** required to construct a solid IT infrastructure, able to manage with the increasing amount of data, is a big challenge for firms, in particular if we consider small and medium enterprises (SME). Another challenge to face is the implementation of a big data technology able to store, organize and produce findings in a **reasonable timeframe**, useful for firms to exploit and turn into actions (Rowe, 2017).

Another concern is from the **employment viewpoint**. In order to manage new and ever-increasing data, it is fundamental to build an advanced analytical capability and related expertise. In fact, advanced analytics require people with an up-to-date expertise and a knowledge from data science to privacy law, including an understanding of business and economics fields (Pearson & Wegener, 2013). Data scientists and analysts, business engineers and consultants are only a few examples of figures highly required in organizations facing the Big Data change. Nowadays, it is hard to find an experienced team in analytics, able to set and manage the technological infrastructure needed. The complexity will increase along with the amount of data and the dimension of a specific company. In our opinion, this field requires a particular attention and will be part of the analysis in the last chapter, related to the case studies we will present.

What described up to this point is not sufficient alone to lead companies to succeed in finding and implementing insights from big data. A change of mind is required, in the organization of business, operations and **culture**. Big data have to be embedded deeply into the company and all the functions: not only IT and marketing have to do so, otherwise, no changes and improvements will come (Pearson & Wegener, 2013). All of that is not easy and can face internal resistance, a lack of synergies to reach the common objective, financial difficulties and inability to fully understand the opportunities that can come from an organized implementation of a "Big Data culture" (Fitzgerald *et al.,* 2013).

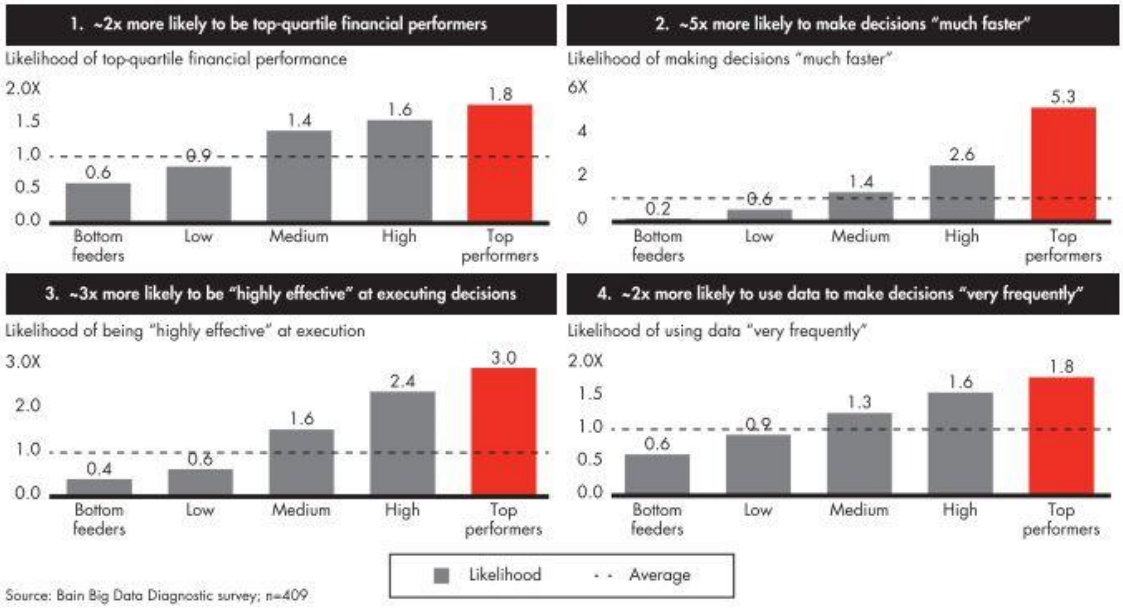
On the other side, the opportunities carried by the Big Data revolution are enormous and able to offset the challenges described. As stated by Yaqoob *et al.* (2016), the three major reasons for implementing a big data technology are "to minimize hardware costs, check the value of big data before committing significant company resources, and reduce processing costs". Under these premises, we want to analyze the main benefits coming from the Big Data culture and technology.

1.3.1.3 Firms' benefits from Big Data: *internal* and *external* opportunities

According to a research published in the Bain and Company Report (2013), four areas in particular can benefit the most from big data analytics and technologies: "improving existing products and services, improving internal processes, building new product or service offerings, and transforming business models". This has been demonstrated by great Big Data leaders in different sectors and fields of business, as shown in Figure 2. We can see from 400 analyzed companies that those implementing advanced Big data analytics are outperforming considering (Pearson & Wegener, 2013):

- the financial aspect, being two times better of competitors in their industrial sector;
- the velocity in decision-making, five times better;
- using data in decision-making very frequently;
- executing decisions in effective ways by analyzing data.

Figure 2: Big Data analytics: outperformance of leading firms (source: Pearson & Wegener, 2013)



To be more clear we can make a distinction between *internal* and *external* benefits for organizations, to better understand which are and how different can be the opportunities implementing a Big Data culture.

As "internal" viewpoint, we interpret the industrial part of a firm, related to the production and the firms' role within the value chain. A huge amount of data can be gathered not only from the outside. In fact, thanks to the technological improvements, it is possible to have data related to the productive system, the efficiency and quality in the production, time and resources involved, problems and diagnostics, and so on. A precise analysis of this data type can improve substantially the way of working and producing, reducing, for example, the downtimes due to hitches. A predictive maintenance is possible to work out, based on data captured from working machines and assets. All of that is translated in financial savings, higher efficiency, limited wastefulness (Bond, 2017).

As "external" point of view, we consider the effects on customers, competitors and employees. A great amount of data is daily produced by individuals and firms, that are unstructured, various, heterogeneous, of different types and sources. In this sense, an efficient analysis of data can really improve the way of:

- understanding and exploiting consumer behaviour;
- discovering potential patterns in purchasing decisions;
- foreseen future needs or preferences;
- developing customized products and services;

- changing current products and services adding new tools or eliminating what is not worth for clients;
- improving the quality, and so on.

In addition, manufacturers are almost considering to develop more services as a competitive differentiator for their simple products (Zhong *et al.,* 2016). Based on Big Data analytics, firms can construct a service strategy to surround and empower the initial offering. We will focus later on this aspect.

Based on what just pinpointed, Big data create an enhancement in IT and Marketing efforts. Firms can gain an edge on competitors, being first movers in their sectors and creating a dynamic environment. As these functions can be better, all the others can do better. As a simple example, imagine the Marketing is able to decide rapidly and to predict more precisely the preferences and trends of the next future, based on real-time data. Consequently, the Financial function can manage the costs following the projections of marketing and, in this way, improve the stream of revenues, deciding with the investment director how and where is possible and convenient to commit more. In our opinion, the synergy described can be traduced in: (1) savings of time and costs, with the ability to be innovative and gain competitive advantage over the others; (2) better internal organization and inter-functional collaboration; (3) ability to focus on the core business and find new market opportunities. Through big data analysis is possible to better organize the operations and make real-time decisions. Gaining insights from data allows for a better understanding of customers, competitors and employees, depending on the needs and objective of a firm.

From Big data derive a great potential for firms to improve the business performance and remain competitive in an ever-increasing complex and digital market. As part of the digital transformation process of firms, Big Data represent the starting point for this transition but a series of other technologies, with related challenges and opportunities, deserve attention from organizations.

1.3.2 The Cloud Computing

At the beginning of this chapter, we focused on the four major technological changes coming along with the fourth Industrial Revolution (Industry 4.0) and the digital transformation of firms. After the analysis of Big Data, we analyze what about the other three innovations: *virtualization, mobility* and *machine intelligence systems* which are related to the explosion of data available, both in terms of data generation and management. We give a brief description

of these technologies in order to better understand their functions and innovation generated into going-to-digital companies.

The virtualization system refers to technologies like *Cloud Computing*. It is not easy to define consensually this technology as there are many applications in distant fields and there are a lot of definitions both from academics and IT Companies and Research Groups. Thanks to a review made by Madhavaiah (2012), we can have a full definition, comprehensive and relevant from both business and technical perspective:

"*Cloud computing is an information technology-based business model, provided as a service over the Internet, where both hardware and software computing services are delivered on-demand to customers in a self-service fashion, independent of device and location within high levels of quality, in a dynamically scalable, rapidly provisioned, shared and virtualized way and with minimal service provider interaction*."

Substantially a cloud computing is a technology where computing is delivered as a service using Internet and users can access their data, applications and other services without the support of a computer or a company's local server. What is stored in a cloud can be accessed whenever using an internet connection. The basic idea is that users can reach what is inside the cloud through the vendor's server on-demand (Marković *et al.*, 2014). The functions of a cloud system are also related to the necessity of collect, store and organize data (and not just), that flow to and from an enterprise. Currently, the cloud computing technology is providing companies with three main services: *Software as a Service* (SaaS), *Platform as a Service* (PaaS) and *Infrastructure as a Service* (IaaS) (Chen *et al.*, 2016; Marković *et al.*, 2014; Mell & Grance, 2011)

Software as a service (SaaS) refers to an on-demand use of software over the Internet. It is by nature based on Web and uses web tools, like the browser. It changes the way of using software, moving from licensing to subscribing to services that is a new model for businesses. Some examples of SaaS application are: customer resource management, IT service management, Web analytics, video conferencing, Web content management. This model is not suitable when real-time data processing in a small timeframe is asked.

Platform as a Service (PaaS) is defined as tools in an environment built to manage and use cloud applications and services. PaaS services are hosted on a cloud and can be accessed easily by clients with a browser; the cloud serves as a platform for the creation of software, delivered over the web. All the tools needed for building the applications are supplied by the

Internet, without having to download or install any software. PaaS services include application design, development, testing, deployment, and hosting (Marković *et al.*, 2014). It means that organizations using a PaaS can develop Web applications and manage each phase of their life-cycle, from the development to testing, distribution and upgrades. This model is important for enterprises in many situations, like in exploiting and leveraging data collected, for example, by the CRM, or when different developers have to work at the same time on a project or third-parties need to interact in a project.

Infrastructure as a Service (IaaS) is also called *Hardware as a Service* because it allows the access over the Internet of a virtual hardware or, in other words, to an elaboration infrastructure. Substantially it makes the IT infrastructure available to end users through Internet (Chen *et al.*, 2016). It is suitable for renting storage and service space and network tools/equipment.

This powerful technology functions as a platform for receiving, storing and analyzing data that firms collect from other technologies/sources. That is why we can consider the Cloud platform and its services as the next Big Data application model able to solve the management and mining concerns related to Big Data. For instance, sensors data coming from products provided with the Internet of Things technology, need a platform with a set of features and functionality which facilitate the communication between sensors and devices. Thus, regardless of operating system or type, is possible to use a common working environment with applications, storage capacity, hardware and services, as a virtual solution that resides over the cloud (Dumitru, 2017). Among the advantages generated by a Cloud Computing technology, we recognize (Chen *et al.*, 2016):

- reduction and savings in costs;
- higher efficiency, and smaller initial investment;
- less IT resources and investment;
- pricing model based on the on-demand type;
- companies can better focus on their core business.

As asserted by Chen *et al.* (2016): “After adopting cloud computing, businesses can improve the utilization of computing resources, reduce capital expenditures, reduce maintenance and operational costs, and improve efficiency through dynamic deployment and recovery capabilities of computing resources”.

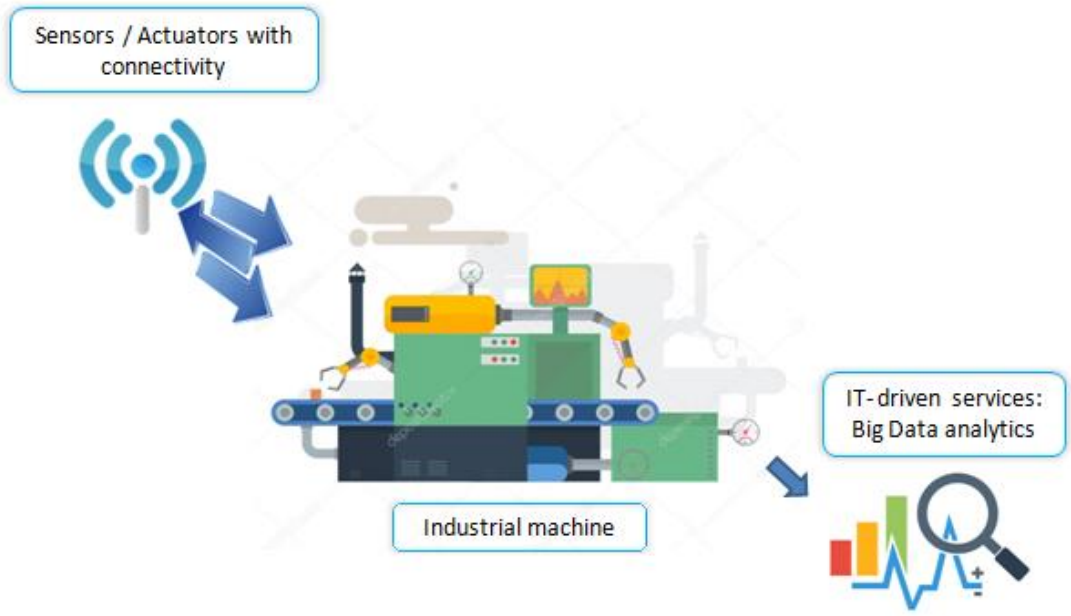
1.3.3 Internet of Things and Industrial Internet of Things

The second system to present is called *mobility system* and includes the Internet of Things (IoT) and Industrial Internet of Things (IIoT). They represent a great step ahead of technological improvements. All the functions and possibilities related to their deployment can empower firms and their strategies.

1.3.3.1 The Industrial Internet of Things: challenges and opportunities

The *Industrial Internet of Things* (IIoT) brings us inside the *smart factory* content and its implications. IIoTs are sensors or connected objects applied to production machines with the aim of monitoring and managing better the production system and of preventing /forecasting problems, like downtimes in the industrial process. The IIoT technology has labelling features, summarized in four key components: (1) information protocols and middleware, (2) sensors, (3) appliances or actuators and (4) information technology (IT)-driven services, like the Artificial Intelligence and big data analytics (Ehret & Wirtz, 2016). We can see these elements in Figure 3.

Figure 3: Key components of the Industrial Internet of Things (source: our chart)



The first refers to the necessary element in creating an IIoT infrastructure, as the IP and middleware are basically the software interface that allows the industrial equipment (like machine, robot or similar) to be connected. The sensors are tools installed to collect and transfer data about machines and the industrial setting around; thus, adding the connectivity, they permit to know real-time information about status and performance of productive

systems. Then, the actuators are all the parts in an automated system that drive movement and change. They can be remotely controlled by operators to solve problems reported by IIoT data and to deploy maintenance or repair activities.

The last component is the IT-driven services, simply because IIoT, with the information and data coming from it, can help to develop information-driven services, adding an important value and potential competitive edge to manufacturing and supply chain systems. This is also related to the move from product to service as a new trend in businesses, discussed later in that chapter.

But what about the challenges and opportunities created by IIoT? It is not new in our discussion the *financial and investment* concern, but in this context, we have to take into account that IIoT devices are implemented on plant/equipment whose value is important in both monetary and business terms. The greater the value of plant/equipment to be connected through Industrial IoT technology, the lower will be the impact on costs and the shorter the time to pay back the investment. This is because the opportunities and benefits generated are able to offset the costs in a faster way. The advantages are lots, for example, IIoT and its infrastructure enable to collect data from the productive process and the analysis can highlight hidden pattern and relationship useful to improve the operations and the quality control. Data generated can give new ideas for product or services, help in the decision-making process, enhance the performance and maintenance management (Freedman, 2017). The impact is not only for operations but also for marketing efforts: the insights coming from sensors installed both in the production and distribution processes can reveal patterns to exploit in developing and making better communication and collaboration with both partners, clients or suppliers in the value chain.

On the other side, there are the challenges to be faced. Sometimes IIoT is required to communicate with devices located so far and this can slow down the process of data transmission. If data are from actual or potential failure in a machine, and the transmission is not sufficiently fast (at least of few and few fractions of seconds), the presence of IIoT is not useful and create additional costs. In addition, the overall infrastructure composed by IIoT, connected platform and network used by organizations, needs to be protected for security issues and, more important, needs a constant update and expansion. The latter is required to let the system be open and adaptable to meet rapidly future requirements (Freedman, 2017).

A different application is for the simple Internet of Things (IoT). One major difference between IIoT and IoT is that the first is designed to be applied *within* the firm, its production

and distribution system, while the latter is generally installed on products and aims to communicate data coming from the outside (Freedman, 2017).

1.3.3.2 The Internet of Things: definition and application benefits

The *Internet of Things* is a new technology that allows, through installing sensors of various type, to connect objects to the Internet. Depending on the field of application and study the term "Internet of Things" can be used to refer both to (Miorandi *et al.*,2012): the overall networking environment, composed by the *smart things* interconnected through a complex Internet technology and infrastructure; the different technologies part of the IoT, such as sensors/actuators, hardware, RFIDs etc.); all the services and applications that leverage these technologies and the IoT to open new businesses and market opportunities. The IoT potential is absolute and has to be defined within specific boundaries to be understood.

Considering the business field, companies have started to introduce numerous IoT products and services (Wortmann & Flüchter, 2015) and several sectors saw an increasing interest in this technology. Examples of the most prominent areas for the Internet of Things are (Wortmann & Flüchter, 2015):

1. The smart home, where intelligent thermostats and appliances, along with remote controlling systems are acquiring a lot of attention by customers and firms;
2. Smart city and public areas, with several projects developed with the aim to improve the energy management and consumption and to improve people's life quality (Khatoun & Zeadally, 2016);
3. Energy and Transportation, with solutions like vehicle fleet tracking, smart parking device systems or mobile ticketing;
4. Healthcare sector, with surveillance systems or IoT devices in hospitals for assisted living solutions;
5. Automotive sector, with an increasing attention to smart things installed on cars, like the so-called "black box" for tracking and monitoring several aspects related to both the car, driving patterns and the driver personal features;
6. Personal and Social domains, going from the social networking applications of IoT to smart monitoring devices which can track any human activity (Aztori *et al.*, 2010).

Generally, developing an IoT solution allow for achieving intelligent recognition, location, tracking, monitoring, collection of data, analysis of behaviour and so on. The main objective depends on the field of application as we can notice from the sectors listed above. A deeper

analysis will be presented in chapter 3. Anyway, we can identify the most important benefits coming from the implementation of IoT technology.

The core of IoT innovation is in the combination of both *physical and digital elements* which create new potentiality to be exploited by firms (Wortmann & Flüchter, 2015). Through the sensors and connectivity applied to firms' products is possible to collect an enormous amount of data, related both to the product itself and who is using it. The analysis of these data is the main vehicle to find relevant insights and patterns, useful for firms for enhancing their business performance and strategy.

As stressed by a Report of 451 Research (2017), data collected from the smart devices are mainly used to create new offerings and services or to improve the current ones (Rowe, 2017). Data can also help in creating new digital services with the aim to enhance the value creation and capture. Additionally, even more companies are exploiting IoT data to "progressively and proactively enhancing customer targeting, finding out more about their customers, their business partners, their suppliers, so that they can not only increase sales but also drive customer retention and improve customer satisfaction" (Rowe, 2017). According to Lee & Lee (2015), the Internet of Things can really improve the operations and the decision-making process and, when there is a relationship of collaboration, the share of data among companies in the value chain can avoid information delay and distortion.

1.3.3.3 IoT projects and challenges

The opportunities of IoT application are enormous, but organizations must pay attention as IoT is not a simple trend to invest in. It is something that needs a reasoning and awareness. Firms must evaluate the aim for which this kind of investment can be profitable for the company, with respect to the sector, competitors, technological state-of-art and entity of the investment. The decisions and changes to do before diving into IoT solutions are relevant and firms need to "construct a consolidated strategy and examine it with an open mind", as stated by Venugopal, head of product for StreamAnalytix at Impetus Technologies, a Big Data software products and services company (Rowe, 2017).

To be successful in IoT project development four steps are basic to be considered (Rowe, 2017). First, businesses must be able to work with a new generation of sensors which do not need necessarily a cloud to gather data and do analytics but can implement an analysis and take decisions on next actions at the same time, using only the device itself without a human intervention. Second, they have to be prepared for Artificial Intelligence (AI) to be

implemented, as it can lead sensor-to-sensor and sensor-to-actuator communication to the next level of evolution. Third, hire and retain a skilled and prepared workforce to give sense to the last step of implementing a sustainable IoT ecosystem and be able to follow the future technological progresses (Rowe, 2017). But, before everything, firms must be aware of what they want to do, the objective, with data coming from these devices. Considering together the IoT potential and uncertain benefits, in the face of important investments, they must evaluate the opportunities with all the challenges of IoT projects, in order to not waste resources (Lee & Lee, 2015).

As a normal consequence, a disruptive innovation like IoT technology, with all the potentiality and opportunities, doesn't come alone and current or future challenges have to be considered. Only the simple explosion in data generation will give problems for managing data and security control, for both companies and customers. Four main challenges can be identified (Lee & Lee, 2015): data management, data mining, privacy and security.

The first two, about *data management and mining,* are something discussed several times up to this point, talking about Big Data challenges. The problems to be faced are related to the larger amount of heterogeneous data that now come from connected sensors. IoT data have so different sources, reporting information on temperature, external conditions around the connected product, metering data, location, movement, and so on. Many times, the storage capacity of companies is not able to concern with these new data, which are also imagines and video, creating difficulties in the data mining practises. The need for advanced tools in analyzing and taking advantage of data is not negligible but essential nowadays. New solutions with the cloud computing technology are at the forefront to manage these problems, as we have stressed beforehand.

Then, *privacy and security* challenges are tied one to the other. The IoT has the potential to enhance consumer's quality of life but privacy protection creates barriers and confidence in and acceptance of the IoT will depend on the protection of users' privacy. (Lee & Lee, 2015). Security issues are extremely important as currently IoT devices, software and what constitutes the underlying network, are not protected sufficiently and can be under the attack of hackers or digital criminals (Myron, 2015; Lee & Lee, 2015). Personal clients' data and enterprise data too, can be victims of security lack. The problem has to be overcome with specific training, creating specialists and letting them be able to protect this property. That's why (maybe) privacy protection, at this moment, need more attention: before to let companies exploit all the potential coming from data possession, a priority is to secure it.

What we have presented supports our vision about the fact that IoT is not a trend but a strategic investment that need a real awareness and profound evaluation of the consequent impact and transformation that will generate into a firm. There is no doubt that the Internet of Things will be an incredible big market (Myron,2015). Gartner (2017) estimated that 8,4 billion connected things would be in use worldwide in 2017, up 31 percent from 2016, and the market will reach 20,4 billion by 2020. Those figures are not irrelevant and give sense to an IoT commitment: for the most adaptive companies, IoT and all the new technologies represent the future.

1.3.4 Artificial Intelligence (AI)

Continuing the analysis of new technologies arisen mainly in the last decades, we present the phenomena of *Artificial Intelligence* (AI), which we have categorised in the *machine intelligence systems*. A lot of time the first thought related to the AI is "robots are substituting more and more workers in several fields, from agriculture to healthcare, where will be the limit? Are they going to replace definitely humans?" (Byrum, 2018; Makridakis, 2017). But artificial intelligence is not only that and the positive contribution it is giving to businesses and manufacturing is not to be underscored.

Firstly, it will be useful to understand what is AI as we are referring to: it is in contrast with the *human intelligence* and comes from the ability of information technology and specialists of developing algorithms that make machines able to interact or execute specific actions. All of this is related to the *machine learning* concept and now we are near to (or already in) the next step of *deep learning* (Korzeniowski, 2018). We will go through these new concepts.

1.3.4.1 Machine learning, deep learning and Artificial Intelligence[1]

Computers are clever objects, able to perform a billion tasks at the same time, analyze huge amount of data, follow precise instructions coming from pre-programmed logic, decision tree or if-then rules. Artificial Intelligence goes a step further as it performs not only pre-programmed tasks but exhibits learning abilities (Makridakis, 2017). The Artificial Intelligence as an academic discipline was founded in 1956 and initially, as now, this technology was developed with the aim to perform tasks considered as uniquely human

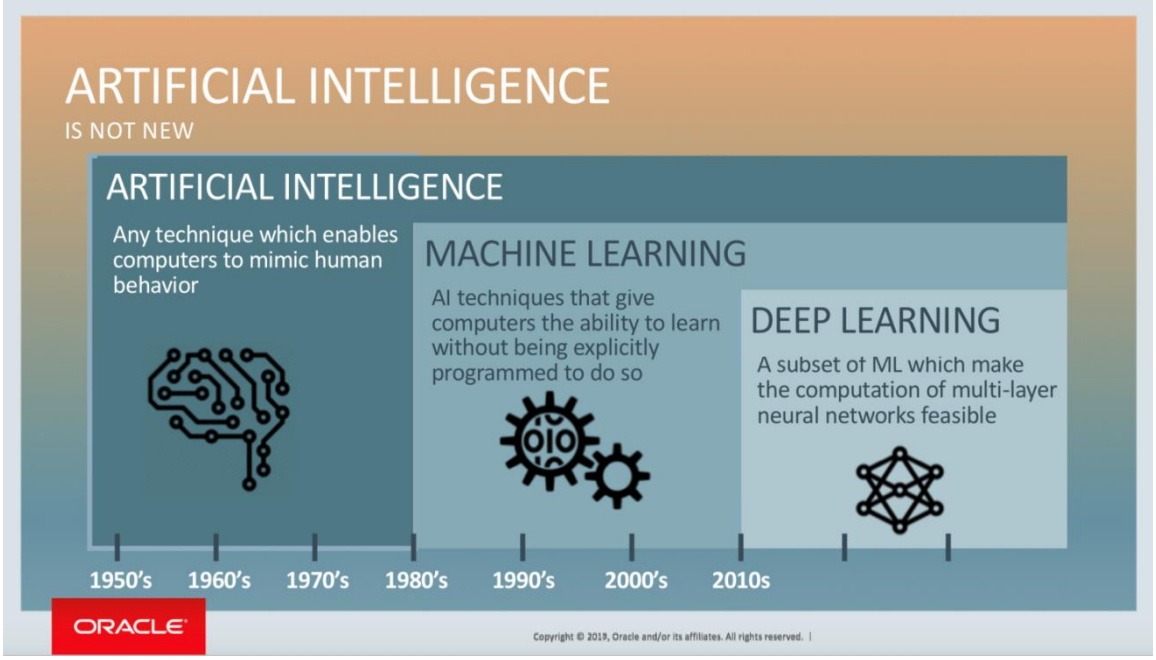
[1] In writing this section, in addition to the cited references, we have collected information on general websites, such as:
https://www.business.att.com
https://www.enterprise-cio.com
https://www.mmh.com

(Jeffcock, 2018). But AI doesn't say anything about how data and tasks are performed. There are several techniques applied, and one of them acquired additional interest since the 1980s: the *machine learning* (Jeffcock, 2018).

Machine learning is a field of study that gives computers the ability to learn without being programmed. It is also referred to as *unsupervised programming*, as the technology is able to find patterns, construct insights and consequently act on their basis (Korzeniowski, 2018). But at that point, machines weren't able to perform tasks considered easy for humans, such as speaking. Here is where the next evolution we have called *deep learning* arrived (Jeffcock, 2018).

The deep learning techniques are a subset of machine learning, known also as *Neural Network* because the findings are based on understandings about how human brain works. With this kind of technology, the AI machines can perform more complex decisions and be more similar to human reasoning. This is possible because the programs are more connected, following the example of our brain's neurons, which can interact and communicate within a specific distance. The connections in the AI are made more free-flowing than a traditional linear programming (Korzeniowski, 2018). A great example of this improvement path is the IBM's Watson project, which at the beginning was able "only" to solve complex games using algorithms that allow this supercomputer to find the best move or solution within the timeframe allowed. Watson computer was famous for beating the two most successful champions of a quiz show (*Jeopardy!)*, searching for the most appropriate answer out of all the stored information in its memory. This is called by professor Makridakis (2017) "brute force", as it is sufficient to analyze billion of information about the game, the previous and best moves, to select how to make decisions in a specific game situation. Thus, this is not considered a sign of intelligence. At that point, Watson was not able to solve games requiring a learning procedure: when there are no solutions based on past experiences, the number of possible moves and decisions are unlimited. The step ahead made by the IBM's project is in the ability of learning from its own mistakes and understanding spoken English. This is at the beginning of the *deep learning* technology, that has been applied also to Watson project. In Figure 4, we can see the relations between AI, machine learning and deep learning.

Figure 4: Relationships among Artificial Intelligence, machine learning and deep learning (source: Jeffcock, 2018 – Oracle)



The question now is how far can go this new AI evolution based on deep learning? There can be different scenarios based on positive or doubting experts' views, but what is obvious is that all these progresses cannot be indifferent with respect to impacts on society, firms and employment concerns.

1.3.4.2 How firms can take advantage from AI

AI technology has been thought to perform, supply and/or substitute humans in mainly all the tasks we are doing now. We have started this part by asserting the main human concern: we are ambitious in developing high technologies able to make our life better, but there is always a counter side as the artificial intelligence may become better and better than humans in performing tasks, even if they born from our intelligence and studies. Maybe, the social structure is not ready to digest this fast and radical change but we need to consider both the positive and negative sides of this technology and take the best from its deployment. To remain in line with our aim, we analyze how AI is impacting firms and their business performance, what is changing, and how to exploit AI to gain a competitive advantage, also with respect to consumer expectations.

The AI revolution is part of the digital one, which has already changed the business environment by diminishing the employment in agriculture and manufacturing while increasing the future importance of services and internet-tied jobs (Makridakis, 2017). Up to this point, we can analyze which are the successful firms in the AI revolution, finding

common elements that have allowed them to reach a leading position in the new technological era.

Following Makridakis's analysis (2017), we find four leading firms in the AI revolution: Google, Facebook, Amazon and Apple. Then, if we define as *traditional* firms those having success before the digital revolution, more than 20 years ago, we see at the forefront companies like Walmart, Johnson&Johnson or Toyota. Comparing them, we notice main differences in the values of market capitalization, which is larger for digital firms, and in the employment value, that is importantly smaller in digital businesses rather than in traditional. There are several reasons that explain the results of such comparison. The most important ones are related to: (1) great productivity improvements while investing in digital innovations, Internet included, (2) R&D investments to offer new products and services and (3) the high expected rates in the next revenues for digital firms. The considered research by Makridakis is based on US firms, where the business fabric is composed mainly by large companies with a greater potential for investment if compared to Italian small-medium enterprises (SME). Anyway is interesting to examine it, as generally, the AI revolution is embraced mainly by firms with a strong financial structure and the ability in changing objectives and values following the digital and technological trends. Those firms have an international base and are capable to gain from digital and AI revolution, in particular because they are supported by a powerful headquarter at the avant-garde. In a survey made among more than 3000 Japanese firms, we find confirmation of what just said about which firms have the required capabilities to face the AI revolution. The evidence shows that "firms with highly educated employees tend to expect positive impacts of AI-related technologies on their business, and vice versa. Larger firms and firms that engage in global markets tend to have positive views about the impacts of AI-related technologies" (Morikawa, 2017).

According to *Forbes* Technology Council, AI is doing great progresses in sectors, in particular healthcare and retail, where we have a lot of robotics and advanced technology deployments. Retailers use AI to enhance customer experience on-site but also to better organize their logistics and distribution (Byrum, 2018), like Amazon does if we have a look at its storage organization.

What we have examined is part of the larger phenomenon introduced at the beginning of our discussion: the *Digital Transformation* (DT) of businesses. The described new digital technologies are part of the entire framework but the adoption of these technologies is not sufficient to embrace successfully a digital transformation. Changes in the overall business

strategy and culture are fundamental and new trends are at the forefront for firms, such as the Digital Servitization pathway.

1.4 The Digital Business Strategy and Digital Servitization: further changes for firms embracing the DT

The advent of digitalization has changed the economic landscape and the optimal way of doing business. The opportunities presented by a process of digital transformation undertaken by firms, including the implementation of new digital technologies, are necessary to stay competitive. The first effort required to organizations is related to a *structural change*. What we have defined as *Big Data or Digital culture* is the first step to embrace successfully the digital transformation, as the transition is not possible by only deploying new technologies or digital processes. Currently, there are several examples of firms unable to keep pace with the new digital era where managers have no clear plans about the strategies to follow for a successful DT (Ismail *et al.,* 2017). Anyway, what is sure is the pivotal role of a dedicated strategy able to give firms the capabilities and organizational structure to achieve a digital transition (Ismail *et al.,* 2017). This strategy is called in the literature *digital business strategy* (DBS). The meaning is to create an overall plan of actions that attempt to take advantage of the digital economies (Sánchez-Montesinos *et al.,* 2018). That is basically what we have described till now. A DBS can be described as a series of competitive actions realized by a firm to stay competitive by offering digitally enabled products or services (Woodard et al., 2013). In a broader sense, a digital business strategy is the ability of enterprises to react and respond rapidly and effectively to what more and more digitally empowered partners/clients demand, in particular using digitalization of products, services and customer relationship (Sia *et al.*, 2016).

According to Sebastian *et al.* (2017), the main steps to successfully embrace the digital transformation strategy see at the end a suggestion: adopt a *service culture*. This is valid both for big old companies and young, digital-born ones. The beliefs of many researchers in the field are that digital and business services will become the future on which firms will develop their strategies. Thus, companies are gaining advantage with the services they provide and this will represent the power of success in the next years. This trend is known as *Servitization* and when it is put together with digital technology impacts, we end up with the *Digital Servitization.*

The term *Servitization* refers to the process in which manufacturers are increasingly offering services coupled with their products (Coreynen *et al.,* 2017). This is in order to make better

the overall value created while differentiating the offering. The literature on servitization points to the different opportunities that manufacturers can gain by shifting to a service business strategy: it is a substitute of product innovation and standardization, a way of dealing with commoditization and, in particular, a strategy to strengthen customer loyalty and engagement (Coreynen *et al.*, 2017). Then, digital technologies and digitalization more generally, have enhanced the potential of a service strategy, as product firms can design, produce and deliver smart connected products where digital services are embedded. This sub-stream of servitization is called *digital servitization*, usually referred to as digital services embedded into physical products (Vendrell-Herrero *et al.*, 2017). A digital servitization strategy allows to differentiate firms' offerings, to stay competitive while innovating through digital tools. The pathway to introduce digital services to a traditional value proposition is not immediate and requires a process of change in business model and strategy. These phenomena will be analyzed deeper in the next chapter as part of the main consequences brought by the digital and technological transformation of firms, in particular when looking at the marketing strategies developed by organizations.

Chapter 2

The Marketing strategy and Digitalization: from yesterday to nowadays

2.1 Introduction

A definition of *Marketing* is not easy to set univocally and it is obviously related to the marketing function/department working inside a company. Behind the marketing definition, there is its customer focus as a driving force to make decisions (Baker *at al.,* 1986). In particular, according to the Macmillan Dictionary of Marketing and Advertising (1998), the marketing concept encompasses three main elements:

- *Consumer's orientation* according to which the centre of companies' activity and thinking should be properly the customers.
- *An orientation* that seeks *to coordinate and integrate* all companies' efforts to reach same and common goals;
- *A profit orientation* through which the organization tries to realize its goals maximizing customers' satisfaction rather than companies' sales.

These elements are tied to the main goals pursued by the marketing function of a company, defined by the *American Marketing Association* as "the organizational function and processes together with the aim of creating, communicating and transferring *value* to customers and of managing a consolidated relationship with them, in favour of the organization itself and its stakeholders".

The marketing thought and business function have a history of roughly one century, fundamental to understand the current state-of-art. For this reason, we organize the current chapter starting with a brief overview of marketing thought development, with a particular focus on the B2B side, as the literature in that field has been overlooked for a long time. The distinction between BtoB and BtoC environments will be analyzed in order to understand if the dichotomy presented in the extant literature can be currently supported. Then, we will define the importance of marketing for the success and growth of firms, giving attention to the strategic marketing. Arriving at current days, we define the main impacts of the digital transformation and technological disruption on the marketing strategies and the future trends which are expected. According to our discussion, in particular when making our own considerations, we define the marketing function and strategies as the *ways through which the organization interacts with the market*. Not only customers and business buyers relationship, but also the value proposition needed to transmit the value, services and products realized to

satisfy the requests of the marketplace, the channels through which reaching the target segments, partners in the value chain and in a firm network. The concept will be clarified in the following.

2.2 Marketing theory development: a brief overview

All the knowledge into the marketing field we currently have is the result of a long path, started formally in the 20th century, but with a more aged birth, even date back to ancient Greek and Medieval era. According to Wilkie and Moore (2003), we can identify four periods in which relevant changes in marketing thought happened. After the Pre-marketing time, that occurred before 1900, we had (Wilkie & Moore, 2003):

1. Era I, "Founding the field" (1900 – 1920)
2. Era II, "Formalizing the field" (1920 – 1950)
3. Era III, "A paradigm shift- marketing, management and the sciences", mainly based on Alderson's works (1950 – 1980)
4. Era IV, "The shift intensifies – a fragmentation of the mainstream", impacted by Kotler's researches and writings (1980 – present).

The Pre-marketing time deals with the foundation of marketing concepts before the formal creation of Marketing as an academic field. It is possible to find traces of macro-marketing issues into ancient Greek philosophers' works, such as how is possible to integrate marketing practices into society, or micro-marketing concepts tied to Medieval thinkers (Shawn & Jones, 2005). Anyway, at the very beginning of its formalization, marketing theory was strongly tied to economics and this occurred in what we identified as **Era I**. In fact, the marketing thought at the early stages, found its basis in the North-American literature mainly focused on a technical - theoretical approach. Around the 20th century, a more structured academic attention was given to the *market distribution*, a part of the business system that was gaining additional importance (Wilkie & Moore, 2003). This was the consequence of a changing economic environment, due to all improvements led by the Industrial Revolution. Immigration, migration of farmers to cities, enlargement of railways and expansion in newspapers and magazine advertising: everything helps to create new connections between rural farmers and urban customers, and in particular among manufacturers and wholesalers and vice versa (Shawn & Jones, 2005). For this reason, the new element of attention was the market distribution system to be organized in order to face a new marketplace with new necessities. In that period, Universities and professors started to propose marketing lectures examining several aspects of the marketing system. In the second part of Era I, distinct

approaches to marketing knowledge creation have been stated (Wilkie & Moore, 2003): *commodity approach* (focusing on all marketing actions involved in a particular product category), the *institutional approach* (focusing on describing the operations of a specialized type of marketing agency, such as a wholesaler or a broker), and the *functional approach* (focusing on the purposes served by various marketing activities), which are part of the general *distribution approach* (Bartels, 1988; Shaw *et al.*,2007).

The **Era II** was strongly important for the changes occurred in marketing studies. During the short time of only 30 years (from 1920 to 1950), lot of different periods passed: from the boom and prosperity of the 1920s, to the Great Depression in 1930s, passing through the destruction of World War II and ending with the post-war period of 1940s (Wilkie & Moore, 2003). Following these transitions, the marketing system showed great changes as well. The main concerns were to formalized generally accepted marketing concepts and *principles*, describing the operations in details and creating an infrastructure for the development of marketing knowledge (Wilkie and Moore, 2003). As one can notice, the approach to marketing issues of this Era is different from how it is today. Academics used to be more concentrated on the description of marketing operations and principles, answering the needs of that period: give a formalization to marketing as an academic field of research. At the end of Era II, this setting started changing with a raising attention to managerial and scientific approaches, which built the basis for Era III improvements (Wilkie & Moore, 2003).

After 1950, entering the **third Era**, marketing thought came to a watershed phase where *science* became the basis for knowledge development and attention *to marketing managers* increased with the aim to be helpful and suggest effective marketing programs (Wilkie and Moore, 2003). The managerial perspective was on academics' interest also before, so what really changed in Era III was the need to help marketers to improve their decision-making process. The shift to a *managerial perspective* is also evident in the development of concepts which remain prominent in the field also today (Wilkie & Moore, 2003): the marketing concept (McKitterick, 1957), the market segmentation as a managerial strategy (Smith, 1956), the marketing mix (Borden, 1964) and the four P's (McCarthy, 1960), brand image (Gardner & Levy, 1955), marketing management as analysis, planning, and control (Kotler, 1967), marketing myopia (Levitt, 1960) etc.

During Era III, marketing system had to face a new massive market with an important growth of population (known as Baby Boom) as a consequence of a post-war world, finally free from all restrictions caused by the war. This changing word, on one side, created new opportunities

but, on the other, required adaptations by firms and marketing managers (Wilkie & Moore, 2003). The new necessity was no more to define marketing and its operations but to improve its theories. During this era, the marketing thought development was mainly affected by the works of Wroe Alderson, who is considered the "Father of modern marketing" (Shaw *et al.*, 2007). His numerous contributions lead to the so-called *paradigm shift* that affected most of the modern schools of marketing thought. According to Shaw *et al.* (2007), three vital changes have been brought by Alderson works:

(1) "from a distribution (or macro) orientation to a marketing management (or micro) focus;
(2) from a dominant reliance on economics to a broader behavioural sciences perspective;
(3) from an emphasis on description and classification to explanation and theory building".

The first shift refers to a change from the previous *distribution orientation* and the attention to explain how markets move goods and products from manufacturers to end-users, to a new *organizational perspective* and its focus on the decision-making behaviour of managers related to their understandings of those markets (Shaw *et al*, 2007). As we have seen while describing Era I, the distribution orientation was proper of the first half of 20th century but did not address more managerially-oriented issues. This was stressed by Alderson how was a pioneer in shifting the attention from markets to the single organization, giving the right basis for the development of marketing management school of thought (Shaw *et al*, 2007).

The second radical change, which can be largely attributed to Alderson's works, was related to the influences on marketing coming from concepts and theories of the *behavioural science.* In the previous Eras, before Alderson's impacts on marketing thought, economics was considered the main theoretical approach for marketing development, while Alderson started to give importance to concepts related to "sociology, psychology, anthropology, and political science" as elements for better understand the marketing theory and thought (Alderson, 1957; Shaw *et al*, 2007). His attention to behavioural sciences was followed by different influences coming from psychology, social psychology and sociology into the marketing discipline and by new works on the consumer-buying behaviour, where important contributions were given by John A. Howard (Howard & Sheth, 1969).

The third transformation where Alderson had a fundamental influence is related to how he and his school (the Wharton School) felt a too-heavy reliance on the description and classification of marketing institutions and activities, rather than building theory in the field

(Wilkie & Moore, 2003). Alderson was concerned with the development of theories as basis for the practise and this is evident in several works during his entire academic life that finally resulted in the 1948's article with Reavis Cox, titled "Toward a theory of marketing" (Shaw *et al*, 2007).

Considering these relevant shifts brought by Alderson and the anticipated changes at the end of Era II, we can understand how both *Management* and *Behavioural sciences* started affecting marketing thought around the same period (Wilkie & Moore, 2003). Even if the two lines of thoughts are both tied by a scientific base, they are so different in their impact on marketing thought development. On one hand, management science is related to statistical and mathematical methods, whose potential was fully strengthened by computers tools born in that time. This was one main factor enabling researchers to apply advanced analytical tools to marketing problems, to model them and find optimization models too. Additionally, studies on multivariate statistics could be used on large data coming from a growing massive market (Wilkie & Moore, 2003). On the other hand, behavioural science is based on consumer researches, coming from other fields such as psychology and sociology. Its role in marketing studies responds to new necessities: understanding and finding insights from the new massive market to be used in marketing decision areas (Wilkie & Moore, 2003). The spread of computer tools was useful for this science as well, making easier to manage large customer-interviews and data coming from surveys and other empirical researches. Substantially in this Era, the marketing field experienced the improvements of quantitative and behavioural research methodologies which gained relative importance.

Era IV occurred from the 1980s and is characterized by intensification and adaptation to the shift lived by marketing thought in Era III (Wilkie and Moore, 2003). This means that both the attention to let the science be on the basis of marketing thought development, and the shift to a managerial perspective remained dominant in Era IV. In particular, this era has been characterized by a *broadening* of the Era III paradigm, where the thinking of Philip Kotler and other co-authors had a dominant role (Shaw & Jones, 2005). Kotler is recognized as one of the most important authors, a *guru* in marketing and management fields, and his contributions are currently influencing the modern marketing thought and development. The broadening movement supported by him was an effort to expand the marketing paradigm from the conventional focus on business activities to other non-commercial contexts, where exchange and relationship activities are present as well (Kotler & Levy 1969a; Kotler, 2005; Shaw & Jones, 2005). Other important contributions of Kotler can be summarized in three mainstreams, where the shifts largely supported by Alderson are emphasised and deepened:

(1) From marketing as a function to marketing as a business process;
(2) From *product-orientation* to *consumer-orientation*;
(3) Broadening the marketing concept.

The first element of influence is a continuum of what stressed by Alderson, that is to give theoretical and scientific basis to the marketing thought and practise. Thus, a managerial perspective is emphasized by Kotler since the beginning of his academic work, with the publication of his most famous textbook in 1967, *Marketing Management: Analysis, Planning and Control* (Wilkie & Moore, 2003). Second, Kotler believes that the first principle which should guide marketing and its planning is the *consumer value* (Kermally, 2003). According to this view, firms have to realize a shift from a market or product-orientation to a consumer one. Finally, the *guru of management*, as defined by the *Financial Times*, defines the marketing concept in a broader sense, as a means to understand, create, transmit and supply value. Additionally, as we have explained beforehand, he is an advocate of the broadening movement.

All the changes occurred in the marketing thought development lead to a fragmentation in the field. In fact it is possible to see how marketing as intended today is so different from the unique marketing mainstream we can define for Era III: currently is hard to stay updated with all the developments in marketing thought and a fragmentation is the result of changes occurred in Era IV. The impacts we should take into account are the process of *internationalization* and the *Internet* allowing for a worldwide connection. This ensures a global interest for and contribution to marketing thought and business concepts development, making global also the body of researchers. At the end we can define this fragmentation as the academics' trend of focusing on specific marketing areas, treating them as independent blocks. They do not attempt to maintain a mainstream in marketing thought but to develop specific areas such as core marketing, consumer behaviour, managerial marketing, marketing applications (Wilkie & Moore, 2003).

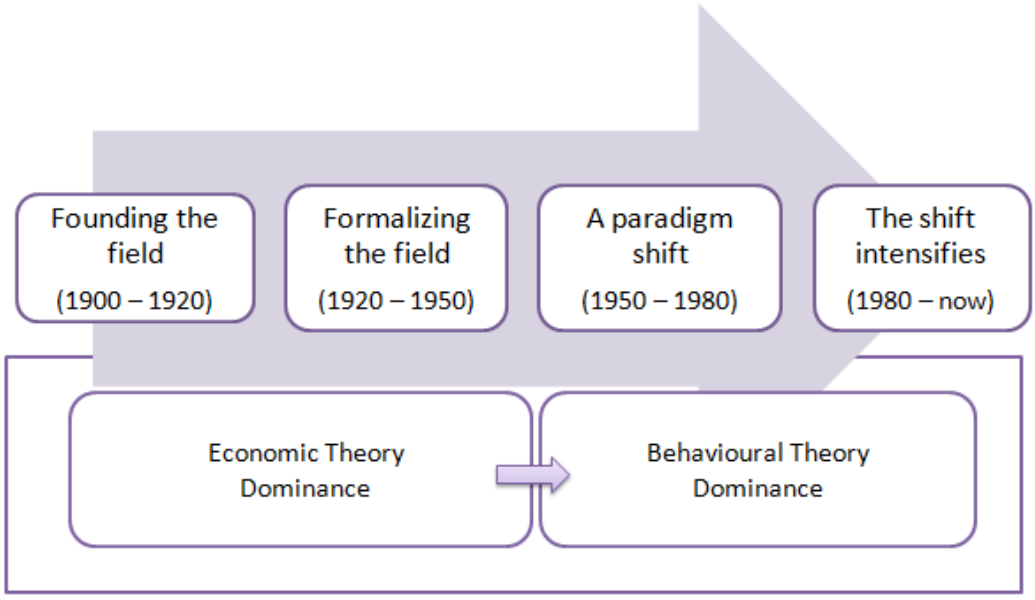
The marketing thought review just described has not an explicit distinction between B2B and B2C environment on which we would like to focus. Even if the two markets can be considered different under several aspects, including the marketing approach and study, the development of B2B marketing thought has been overlooked for years.

2.2.1 B2B marketing thought: the importance of behavioural science

The B2B marketing thought and its development over time are reflected by the same four Eras we have described beforehand, but B2B marketing has been overlooked for years in favour of a deeper analysis of B2C firms and strategies. Theories on business marketing gained attention only in the last three decades, even if industrial transactions have existed for millennia (Hadjikhani & LaPlaca, 2013).

Currently, B2B research has a rich body of literature through which we can identify two main periods of development (Hadjikhani & LaPlaca, 2013): the first one, where the economic theory applied to marketing was predominant and then a subsequent shift to behavioural theory in marketing decision-making process. The simplest distinction between two phases helped us to understand the deeper importance that behavioural and relational marketing has into a B2B context. Anyway, the two periods occurred during the development of the four Eras, as we can see in Figure 5, so they overlap.

Figure 5: Balance of economic and behavioural foundation in B2B marketing theory (source: Hadjikhani & LaPlaca, 2013)



As we have analyzed in the previous section, the initial marketing theory was a mere application of the economic theory with a poor product differentiation and the belief that the targeted market was homogeneous. This has been stressed by the contributions of Alderson and later, of Kotler. The concept followed in industrial transactions was the lowest price for an acceptable quality and delivery with the low-cost supplier getting the sale (Hadjikhani & LaPlaca, 2013). Firms were looking for having the best result by lowering the production

costs and maximizing profits, without considering the importance of constructing reliable and durable industrial relations. In the middle of 1900, Alderson and Cox (1948) and Alderson (1949) were the first researchers opposing the behavioural concept to the prevalent economic theory. But it took several decades before B2B relationship marketing gained a new strength: before this time the focus for researchers was the new managerial marketing field which gave rise to theories like marketing myopia, marketing mix and market segmentation, central in marketing studies also today. While in consumer marketing research the importance of behavioural science to understand and predict buying behaviour was suddenly recognized, in B2B marketing research the process was slower (Hadjikhani & LaPlaca, 2013).

At the end of 20th century, first foundations of relational theories on industrial marketing were accepted, based on behavioural science rather than economic one. The main aspects emphasized by the new B2B marketing prospective were (Hadjikhani & LaPlaca, 2013):

- the irrationality or bounded rationality, uncertainty and mutual satisfaction opposed to the rationality in transactions and profit maximization;
- long-lasting relationship between those involved into a transaction rather than the economic science reliance on homogeneity within market segments and short-term interactions.

The new perspective required a shift of mind: from a single unit (central in the economic theory, such as firm or consumer) to multiple members involved in the production and sale, with the related distribution channel (Hadjikhani & LaPlaca, 2013). Even if behavioural science started to modify B2B marketing thought during the 20th century with a first work of Reilly (1929), which introduced methods for investigating retail relationships, only in the last three decades we have influent studies in the field. For instance, one prolific area of research was the *organizational buying behaviour*. But the first two studies really tied to B2B behavioural-based marketing can be recognized to Hudson (1971) and Mattson (1973), whose works developed the new concept of mutual benefits required to strengthen the relationship between buyer and seller (Hadjikhani & LaPlaca, 2013). In the 1980s, the main contributions pushing effectively the transition from economic to relational theory in B2B marketing thought were realized. One main effort is recognized to Håkansson (1982) and colleagues who opened the content of B2B relationships. According to his view based on behavioural studies, a *relationship* is intended as ties bounding the parties to each other for a long time. The involved parties have specific features which affect the B2B relationship: the organizational structure, technological know-how, financial strength and stability, and

operational strategies (Hadjikhani & LaPlaca, 2013). On the other side, also the relationship concept itself has general recognized characteristics, such as stability and high frequency in the exchange, relationship commitment and trust and relationship adaptation. All the subsequent studies were focused on the *interaction model* prospective where B2B relationships were seen as a means to "increase competitive advantage, reduce transaction costs, decrease the opportunism and increase efficiency and effectiveness" (Hadjikhani & LaPlaca, 2013).

After our analysis of literature reviews is possible to notice how B2B relationships and the studies on organizational buying behaviour became leading topics in industrial marketing research, stressing the importance of long-lasting interactions which need attention by parties, as part of the competitive advantage. This point suggests one big difference between consumer and industrial marketing strategies, concerning the *relationship concept* and the related marketing strategies. According to the extant literature, business firms have a strong incentive to construct and maintain durable relationships with every single buyer. While B2C firms consider customer satisfaction and engagement pivotal as well, but the aim of their marketing efforts seems to be more concerned with the number of transactions rather than maintaining long-term relationships with clients. In the theoretical framework, the two different approaches to customer relationship strategy give rise to the dichotomy between *transaction* and *relational marketing.* This is only one element making different business and consumer firms and their marketing strategies. The literature has defined specific characteristics that allow the existence of a dichotomy between B2B and B2C firms, arriving to differentiate the respective marketing approaches and the concepts of transaction and relational marketing.

2.3 Going beyond: main differences between B2B and B2C marketing

One way to understand if you are dealing with a B2B or B2C enterprise is to ask a simple question: "Is the demand for a product or service driven by the demand of some subsequent customers (B2B) or *primary* driven by the specific tastes or preferences of the buyer (B2C)?" (Lilien, 2016).

The question above stresses a traditional and strict distinction made between B2B and B2C firms: business-to-business is generally used to refer to interactions among organizations (value chain intermediaries), while the term business-to-consumer refers to final interactions which involve the firm and individual customers. Anyway, it is hard to find an organization that purely embedded either a B2B or a B2C stereotype. That is why, in our opinion, it is

more suitable to talk about a continuum line where B2B and B2C pure definitions and marketing strategies are at the extremes, and, in the middle, a pool of unlimited and mixed situations exist.

Anyway, a dichotomy is present in the literature that makes a distinction between the two types of firms and, in particular, the respective marketing strategies applied. At that point, our aim is to understand these differences and if they are still relevant. According to several studies on the field, we have summarized four main points where B2B and B2C marketing practises are different (Mora Cortez & Johnson, 2017; Lilien, 2016, Alon & Jaffe, 2013; Brown *et al.*, 2007; Cova & Salle, 2007; Webster, 1978):

a. different type of customers;
b. different market structure and influences;
c. different buying decision process;
d. different buyer-seller relationship.

2.3.1 Different customers' type and market structure

As anticipated in the simple question used by Lilien (2016), a first way to make clear if we are dealing with a B2B or B2C firm is to identify the customers' type. B2B firms focus their efforts on satisfying other organizations which are lower in number, heterogeneous and with different size and power (Lilien & Grewal 2012, p.3; Coviello & Brodie, 2001). This gives rise to some problems related to: different purchasing requirements, service needs and interests, which can be managed with a segmentation strategy. Segmentating the market in a B2B context has the same aim of a B2C segmentation process, that is to divide the market into homogeneous sub-groups of customers with similar characteristics, in order to make better marketing decisions and resource efforts (marketing-mix strategy). What differs is the approach and variables to be used for segmenting and targeting the market. The market structure for industrial firms is varying and fragmented with few buyers and sellers which exert a strong influence one to the other (Lilien & Grewal 2012, p.3).

On the contrary, B2C clients are physical people, potentially or currently interested in the offering of a consumer firm. The size of B2C marketplace is completely different and marketers often have to deal with a market that reaches many thousands and even millions of individual customers (Alon & Jaffe 2013, p. 238). In this context the segmentation strategy to implement required more attention due to the complexity of the market structure. Preferences, tastes, characteristics, behaviour, purchasing process influences and many other drivers may

be considered for segmenting the market. The challenge for B2C firms is to identify the right variables to make as homogeneous as possible the customer segments and then define the targets and related marketing resources to invest in.

2.3.2 Different buying decision process

The buying decision process is more complex and articulated into a B2B organization as it involves more parties, people and functions. The volume and importance of transactions are more relevant compared to those of B2C firms, in particular when considering the purchasing capacity on a single transaction basis. The complexity of B2B buying process comes from several aspects. Beyond the large number of people involved, we should consider: the environment in which the firm operates, potential large volume of money involved in a single exchange, complex technical and economic factors that influence the process (Webster, 1978; Brown *et al.*, 2007). Due to this complexity, the reaction of buyers to B2B marketing efforts may occur after a longer time if compared with a B2C case, where the customer reaction to a promotion or special offer can be immediate. This enlarges the B2B lifecycle of buying processes (Coviello & Brodie, 2001) and make difficult also to measure the results from the marketing planning.

2.3.3 Different buyer-seller relationship: The *Transaction* and *Relational* marketing

"Interestingly, it is the relational dimension of business markets that has been commonly used to differentiate B2B marketing from that of consumer marketing (Webster, 1978; Ford, 1980), and as summarized by Hutt and Speh (1998, p. 32):
. . . relationship management constitutes the heart of business marketing." (Coviello & Brodie, 2001)

The words quoted above bring us to the initial distinction we made between *transaction* and *relational marketing*. According to the extant literature on this field, it seems that B2C firms tend to rely on transaction marketing approach while business-to-business organizations are more affected by relational marketing practices. The distinction reveals a basic difference in the buyer-seller relationship undertake by B2B and B2C firms. The dichotomy exists in the extant literature but, based on the study of Coviello and Brodie (2001), we can support our perspective. In our opinion, considering the current objectives of marketing practices, the changing economic landscape and related consequences, the distinction made in literature is

only partially true. The cited study supports our thought that will be presented at the end of the current discussion.

First, we need to give a definition to the two approaches. Relational and Transaction marketing are generally seen at the opposite poles of a continuum marketing strategy. With *transaction* or *traditional* marketing, we refer to a business strategy focused on single sales in the short term, giving importance to maximize efficiency and volume of individual sales (Christopher *et al*., 1991). Then, this approach does not involve customer commitment and contact as the goal is to *get* customers (Grönroos, 1995; Coviello & Brodie, 2001). On the contrary, *relational* marketing gives emphasize to retain customers, engaging long-term relationships from which gaining mutual benefits. The strategy aims for consumer commitment and consumer contact (Coviello & Brodie, 2001), then the goal here is not only to *get* but also to *keep* customers (Grönroos, 1995).

The research conducted by Coviello and Brodie (2001) aimed to evaluate if the dichotomy between B2B and B2C firms and respective marketing strategies does exist also in the current economic environment. In fact, previous literature supporting the distinction was based on 1950s models and ecosystem, both of which have evolved so far. From a first approach, the results highlighted a general difference between business and customer marketing strategies, meaning that the two types of organizations tend to involve different strategies in their marketing planning. This could be a logical consequence derived from: different type of customers served, different offerings, different market structure and organization and so on.
Going deeper in the research, Coviello and Brodie tried to find the type of strategy adopted, if more *relational* or *transactional*. Evidence from the study underline that B2C firms practise significant higher levels of certain aspects of transaction marketing (Coviello & Brodie, 2001): "... they (consumer firms) are more likely to: focus their efforts on attracting new customers; emphasize the product offering; invest in areas related to the traditional marketing mix; emphasize marketing communication that is directed from the firm to the mass market; engage in customer contact that is arms-length and impersonal; and participate in relational exchanges which involve no future personalized contact between the customer and the firm." On the other hand, B2B firms are more likely to invest efforts in some aspects of relational marketing, with a focus on developing interpersonal contacts with primary customers and a marketing communication that involves single employees with their customers (Coviello & Brodie, 2001).

Up to this point, nothing is new related to the previous findings in the literature that support the dichotomy. The relevant finding is that, while certain differences emerge in comparing marketing practises of B2B and B2C firms (as seen above), the similarities are more than the differences. For example, both types of firms show efforts to retaining customers and implementing communication technology in order to acquire customer information and realize a personalized interaction (Coviello & Brodie, 2001). The similarities just described are part of a relational perspective but there are also similarities closer to a transaction strategy. For instance, B2B and B2C organisations both demonstrate an interest in generating financial returns with marketing activities in the hands of a functional manager (such as sales manager or product development manager) (Coviello & Brodie, 2001).

We can conclude that B2B and B2C firms reflect contemporary marketing strategies which draw from both relational and transaction perspectives. The dichotomy as described in the literature of 20th century is no more valid in a generalized sense. This means that the current marketing practices attempt to develop marketing-mix strategies to attract customers and employ technology in order to enhance customer relationship. They also give importance in creating and managing personal relationships with buyers but do not forget the network issues, trying to reinforce business relations into their market (Coviello & Brodie, 2001).

After a review of well-known works on transaction and relational marketing, we have developed our own opinion. Following one or the other marketing approach depends on several aspects of an organization, such as: the product and/or service produced, the aim and vision/mission, the organizational structure of a firm (how it is internally organized, if there are functional interdependences or if each function works as a *per se* silos etc.) , the market to face, how is organized the marketing department. The two strategies are at the opposite poles of a continuum, due to the radical differences, but in the middle unlimited mix exists. As stated by Coviello and Brodie (2001), both types of marketers tend to create a balanced mix between transaction and relational practises. In our personal view, currently, the largest part of firms spends greater efforts into the part of marketing strategy related to the *relationships*. What separates B2B and B2C is the *aim* and *type* of strategies, which creates the basis for different "shades" of the *relationship concept*.

For instance, one goal of BtoC firms can be to augment their consumer-basis, due to the larger audience they have to manage which represents a source of competitive advantage. Differently, BtoB firms have to find suitable counterparts, selecting from a smaller range of alternatives if compared with the size of a mass-market. Potential buyers are only a few, thus,

business firms have a real and tangible chance to focus on *every single relation* and invest in it, in order to keep and retain the business buyer. This is not the same for consumer enterprises which face million and millions of customers, so their aim moves towards reaching and boosting the *customer engagement*, enhancing their *satisfaction* and *experience*. That is investing resources and efforts to understand in advance customer needs and preferences, creating a personalized offering to satisfy and retain those customers and to improve the marketing-mix strategy. Customer firms are more concerned in enhancing the *customer experience*, that is the customers' perceptual and emotional responses due to the interactions with the firms' products, services and other elements (Chang *et al.*, 2014). While business firms may be more interested in strengthening the *collaboration* with their industrial clients. This is what we mean with "several shades of *relationship concept*", which affect the type and aim of marketing strategies implemented by B2B and B2C firms. We will more clear in the next sections, in particular when introducing the recent developments of marketing strategies due to the process of digital and technological transformation. It is clear how companies in current days cannot focus only on volume and single sales maximization (transaction marketing) and this is also a restriction made by the new economic environment where firms are competing. This is what we take into account in the next part, analyzing the new potentialities of marketing strategies and how the changing/digital economic landscape has impacted on marketing and relationship strategies employed by B2B and B2C firms.

2.4 Recent Marketing developments

The age we are living and the changing economic landscape for companies derive from the *digital disruption and technological revolution*. The digitalization is leading to a faster world where all decisions and changes happen in a smaller timeframe than before. Companies must adapt and react to the challenges brought by the digital and technological revolution. Digital technologies are completely changing business environment, business strategies, processes, capabilities, products and services, the relationships in both consumer and enterprise space (Bharadwaj et *al.*, 2013). One reaction is the adoption of a *digital business strategy* that involves the organization in its complexity. As we have seen in chapter 1 (see *infra*, §1.4), a digital business strategy is the ability of enterprises to react and respond rapidly and effectively to what more and more digitally empowered partners/clients demand, in particular using digitalization of products, services and customer relationship (Sia, Soh, & Weill, 2016). All the strategies at the single functional-level should be adapted into a digital framework, taking advantage of the new digital resources to create a differential value (Bharadwaj et *al.*, 2013). The alignment between the firm business strategy and the process of digitalization can

create a synergy able to lead companies through a successful transformation. In that perspective, also the marketing strategy should take advantage of and be blended into a digital business strategy.

The marketing thought and practice is evolving to current days, where influences and new capabilities required by the digital era are fundamental to stay competitive. The process leads to several changes in the marketing strategy and application, which we are going to analyze and understand.

2.4.1 The impact of digitalization and new technologies on Marketing strategies

The technological revolution is affecting firms under several aspects, from the economic landscape where to compete, to the business strategy and practise to adopt to survive and gain competitive advantage in the new arena. All firm's departments need to be re-aligned respect to the digital business strategy which has also impacted on "the nature and activities of marketing institutions" (Sheth & Parvatiyar, 1995). The new marketing approach has to be developed in a digital landscape with managerial and strategic consequences (Bharadwaj *et al.*, 2013). As we have anticipated in the introduction of this chapter, our working definition of *marketing* and its strategies reflects the way organizations interact with the market. It involves customers, business buyers, partners in the supply chain or network and the relationship with them, the value proposition, products and services to create and deliver, reaching the target market satisfaction and the channels through which transfer the created value. In this perspective, we analyze the main impacts that the process of digitalization and technological revolution is having on the marketing strategy.

2.4.2 Everything starts with Big Data

Beforehand we have described the Big Data revolution and the huge impacts they brought to society, habits of customers/people and organizations in their complexity. The big challenge with an increasing amount of data is in finding the right and profitable ways to manage and extrapolate useful insights from them. This has forced a radical change in the attitudes, required skills and internal organization of firms, bringing them into the realm of a digital word. In our opinion what has really challenged and transformed the marketing strategies started with *Big Data.*

Big Data sources are potentially unlimited following the improvements in technology and Internet usage which is embedded in our daily life. Relevant data for business and marketing purposes are generated by people as customers but also by enterprises as partners, suppliers or

buyers. Those data can be leveraged to gain insights and make better marketing decisions. But, if on one side is evident how big data are extremely valuable and create great opportunities, on the other hand, many issues arise, related to data capture, storage, analysis and visualization (Chen & Zhang, 2014).

2.4.3 From Big Data sources to Marketing Analytics

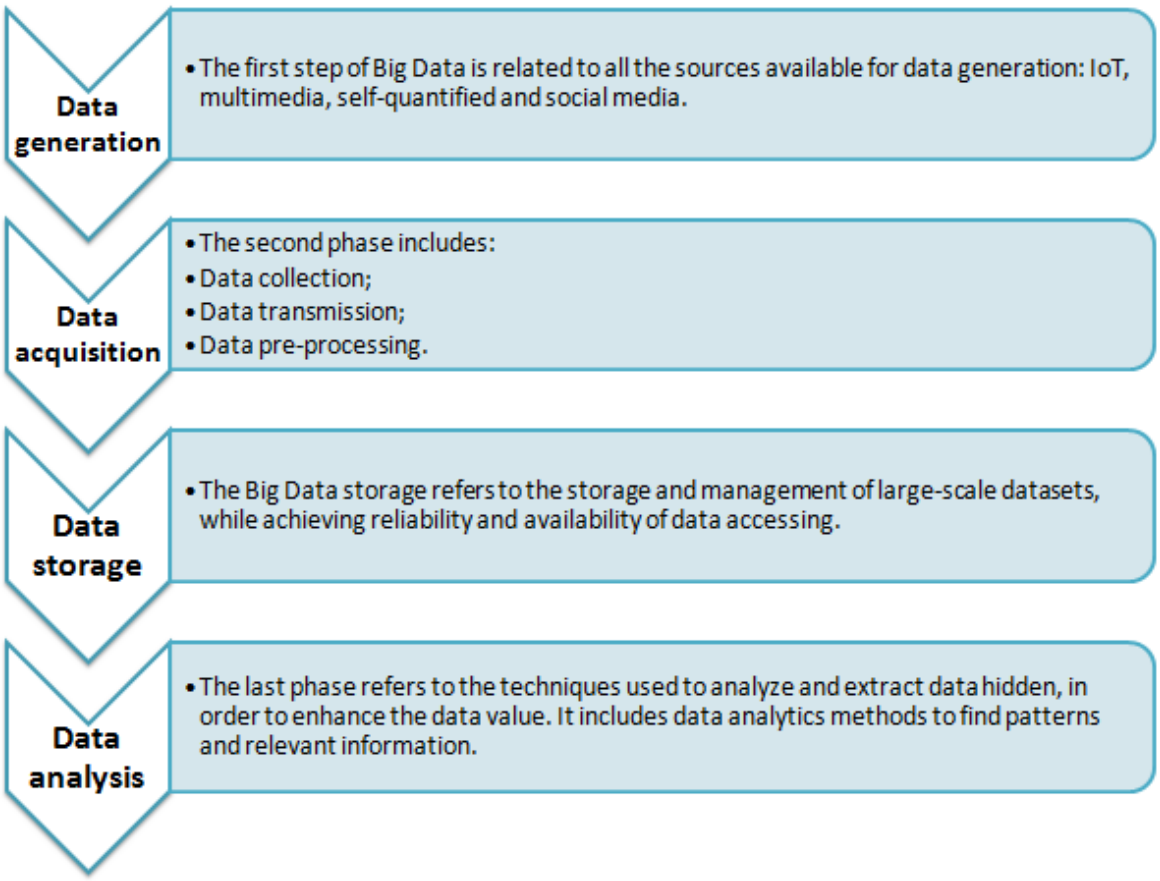
In the first chapter, we have identified the main sources of data, valuable for organizations and marketing goals, which can be clustered into: Internet of Things, self-quantified, multimedia and social media sources (Yaqoob *et al.*, 2016). Following this classification, we can highlight and distinguish between relevant data in BtoB and BtoC contexts. In this prospective IoT data are generated both by organizations and physical customers, while self-quantified, multimedia and social media data are valuable mainly into a business-to-consumer landscape.

IoT is currently the most promising technology in the business environment and the future potentialities and applications are enormous. Internet of Things are smart products/devises with embedded sensors which allow a wireless connection. They are able to interact with other objects and humans and the potential sectors of application go from transportation and agriculture to environmental monitoring or security surveillance (Ge *et al.,* 2018). They are considered a major source of data generation (Chen *et al.*, 2014) and in a business context data can be generated by IoTs used by both physical customers and organizations. On the other hand, self-quantified sources of data are generated by monitoring individual and personal behavior, while multimedia data come from text, imagines, videos and similar. Social media data have caused a surge in data generation coming exactly from social media like YouTube, Facebook, LinkedIn, Instagram and similar (Yaqoob *et al.*, 2016).

Regardless of the source generating all the amount of data, firms need a technological infrastructure able to handle with them without wasting resources or losing useful insights. Managing Big Data requires to follow a value chain, constituted by four phases: data generation, that is what we have explained about data sources, data acquisition, data storage and data analysis (Chen *et al.*,2014). A brief description of the Big Data value chain can be found in Figure 6. What we want to stress is that each phase requires specific techniques and technologies, part of a solid technological infrastructure with professional figures able to handle with it. This is one of the major threat related to Big Data. However, the implementation of new technologies for Big data has enhanced business performances, the process of product and service innovation and in particular the **decision-making process**

(Yaqoob *et al.*, 2016). The decision-making process is largely impacted by the last phase of the Big Data value chain: data analysis. All data gathered have to be analyzed with specific techniques and the aim is to reveal new findings, behavioral patterns, hidden information and so on. This is the goal of *Marketing and Customers Analytics*.

Figure 6: The Big Data Value Chain and its four phases (source: Chen *et al.*, 2014)



2.4.4 Big Data Analytics and marketing opportunities

Big data analytics applied to marketing refers to tools which help find hidden patterns into data coming from customers and then interpret those data in the right way to gain a competitive advantage (Erevelles *et al.*,2016). Data related to customer behaviour, preferences, purchasing-decision process, habits, product or service usage or state/condition, recurrent problems and so on, flow to firms hands/systems (potentially) every day, in real time. The information coming from an accurate analysis is strongly valuable to construct efficient marketing strategies. Both physical, human and organizational capital resources are necessary to process the increasing amount of data (Erevelles *et al.*,2016). This is in line with what we have seen till now: with physical capital resources we intend technological infrastructure necessary to collect, store and organize Big Data; then, human capital resources refer to data scientists, strategists, business engineers and similar professional figures, able to

capture and analyse insights from data; finally, organizational capital resources encompass a strong organizational structure with the capabilities to change its culture and gain advantage from big data and their potential, turning insights into actions (Erevelles *et al.*,2016).

Under this framework the opportunities for firms deploying marketing analytics are huge and we try to summarize the potential benefits for both B2B and B2C firms. The benefits for the two types of firms are the same, but with different applications in the respective fields. Beyond the support for a better decision-making process, marketing analytics allows for (Chen & Zhang, 2014):

a. Improvement of current products and/or services;
b. Creation of new products and/or services;
c. Better services related both to customers (SSC) and products (SSP);
d. Identification of new customers and markets (better segmentation, targeting and positioning strategies).

As we can see the use of data and related technologies allow for a better *customer engagemen-relationship and satisfaction* both in BtoB and BtoC environments. The goal of firms employing big data and marketing analytics can be summarized into the *willingness to enhance and strengthen the relationship with their market*. All these potential benefits are made possible by the process of digitalization and its impacts on the marketing department.

2.4.5 Obstacles in implementing Big Data Analytics

It is important to recognize that not all firms employing marketing analytics are able to successfully leverage big data for their strategies (Erevelles *et al.*,2016). Failures may derive from some weaknesses in one or more capital resources. For instance, disappointing results occur when a firm is not able to educate all departments and members to evolve around Big Data or, in other words, to develop a data-driven decision culture and a new way of doing business. This concerns a failure of organizational capital resources. Or it could be possible that the technological infrastructure with the dedicated professional team is able to process and discover insights from customer and product data, but is not able to *exploit* them (Erevelles *et al.*,2016). The lack of professional figures able to deal with big data technologies, able to find relevant patterns through data analysis and able to use them to improve marketing performances and results, is a big concern for companies. Difficulties in finding experienced people in the field are related to a slowness in the education and training of data-scientists and similar figures by marketing departments in business schools, which

have to create specific curricula (Erevelles *et al.*,2016). Additionally, companies usually search for employees with experience in the job, difficult to find due to the newness of these professions. For this reason, firms have usually to decide if to outsource Big data analytics or try to create an internal team with the required capabilities. In the case studies presented at the end of our discussion, we will analyse the aspect of rare data-skills and the solutions adopted by our interviewees.

2.5 New trends in marketing strategies: Customer Engagement and Servitization - Digital Servitization

Both B2B and B2C firms can gain a competitive advantage in the new digital arena with the exploitation of big data, managing the different sources of data and working on the new digital technologies. Firms are changing the way to approach marketing strategies due to the impacts of digitalization and, in our opinion, this process is leading firms to follow new trends in the development of marketing strategies. In particular, there is an improvement in the *customer engagement area* and an increasing *attention to services and related strategies*. To support this idea we can have a look at the benefits listed above, which come from marketing analytics practises. These benefits are a consequence of the digital transformation and new digital technologies implemented. We can cluster them into two macro-segments which represent the new trends in marketing strategies, as a consequence of digitalization (Table 1).

Table 1: Two areas of marketing strategies firms are improving more due to the process of digitalization (source: our chart)

1. Improvement of Customer Engagement strategy	2. Turn to *Servitization* and *Digital Servitization*
a. Improvement of current products and/or services; b. Creation of new products and/or services; d. Identification of new customers and markets (better segmentation, targeting and positioning strategies).	c. Better services related both to customers (SSC) and products (SSP). Considering also the improvement of current services and the creation of new services

The digital world is creating new opportunities for marketers with respect to both customer engagement area, servitization and digital servitization strategies, embedded into the overall marketing strategy.

2.5.1 The Customer Engagement strategy

According to Ransbotham and Kiron (2018), analytics, with the integration of new digital technologies (such as IoT and AI), are driving customer engagement, and organizations with the higher level of analytical maturity see a marked advantage in developing a strong

customer relationship. In Figure 7 we can analyze the cited result of Ransbotham and Kiron (2018). The study is based on 1.919 managers from 101 countries, and the respondents have been classified into one out of three categories: Analytically Challenged, Analytical Practitioner and Analytical Innovators. The distinction is based on the relative level of expertise in adopting analytics. The Analytically Challenged firms demonstrate limited capabilities in the field, while Analytical Practitioners mainly use analytics to support and track performance indicators. Analytical Innovators are the most advanced organizations which have changed their culture and business strategy, involving analytics in each aspect of strategic decision-making process. The graph (Figure 7) supports the findings of the cited study, that is most analytically mature firms are "twice as likely to report strong customer engagement as the least analytically mature organizations" (Ransbotham & Kiron, 2018).

Figure 7: Customer engagement and maturity levels in analytics (source: Ransbotham & Kiron, 2018).

Both business and consumer firms can use data, analytics and digital technologies to improve their customer engagement (and relationship) and, in doing so, they are revolutionizing the marketing potential.

2.5.1.1 B2C firms and Customer Engagement under digitalization

Beforehand we have suggested that BtoC firms find the most relevant sources of data from self-quantified, multimedia and social media data. These types of data are largely generated by *mobile devices* such as smartphone, tablet and similar. Our life rotates around these technologies as we can do everything with them, from texting to shopping online (Ransbotham & Kiron, 2018). Once businesses have access to data generated by mobile

devices they can profile individually each client, finding information on preferences, tastes, purchase decision process, health conditions, geo-localization and other unlimited types of insights. Furthermore, Internet of Things as smart connected devices, represent another valid mobile source of product and customer data. Through IoT, B2C firms can have access to additional information about product usage, maintenance, recurrent problems, diagnostics and so on. IoT data represent a new outer reach that we will investigate deeper in the next chapter. These unlimited and valuable streams of data allow B2C firms to boost their *customer engagement strategy* that consists mainly in personalization, marketing-mix optimization (Wedel & Kannan, 2016) and, we want to add, *customer experience*.

The marketing-mix strategy can be reinforced using new sources of digital data which allow for a better resource allocation and for a better understanding of customer reaction to marketing efforts. Then, according to Wedel and Kannan (2016), "personalization takes marketing-mix allocation a step further in that it adapts the product or service offering and other elements of the marketing-mix to the individual users' needs". The personalization can be realized at different granular levels (Wedel & Kannan, 2016):

a. mass personalization, where the marketing-mix and/or offering is adapted to average tastes of target customers;
b. segment-level personalization, where the adaptation is done with respect to the homogeneity revealed by the segments served;
c. individual-level personalization, in which each client receives a personalized offering or marketing-mix element supported by the analysis of individual data on behaviour, preferences and tastes.

The level of granularity in the personalization depends on marketing objectives and effectiveness, in particular when the personalization is at a very individual level. The process is flexible as different elements of the marketing-mix can be developed with different levels of personalization. For instance, Ford Motor Company develops a global (mass) brand image; focuses on segments to adapt product and brand advertising; sales efforts with prices and promotions, are customized on an individual level; and it offers personalized in-car experience using imaging technology (Wedel & Kannan, 2016).

The last point is an example of *customer experience* concept: B2C firms can exploit data and digital technologies with the intent to create and enhance the *customer experience,* for instance providing the product with new services, including digitalized ones. A *service strategy* can be implemented into the marketing plan of B2C firms to create an *experience* that

surround the traditional offering, as consumers are looking even more to this experience, both in the purchasing process and when utilizing the product. In our view, the *customer engagement* enriched with the concept of *experience* is a new strategic asset where to focus and invest efforts, and the process of digitalization is leading consumer firms to focus on this new asset as one of the main and profitable vehicles to bolster the customer engagement strategy.

2.5.1.2 B2B firms and Customer Engagement through Servitization

On the other side, B2B firms can gain even more significant benefits from digitalization in their business relationships (Ransbotham & Kiron, 2018). Their main goal using business data and analytics is to strengthen the relationship with business partners and buyers, in the view of a long-lasting engagement. The client basis is completely different if compared with millions of individual customers, typical of a B2C market. Data flowing from business clients to a business company can be analyzed on an individual basis but the objective is different respect to B2C firms. Patterns and relevant insights are used to carry out personalized solutions, increasing the collaboration and relation with clients. In a B2B setting, this is realized with huge investments in *services* alongside the traditional offering/product. Thus, S*ervitization* and *Digital servitization* strategies are a strong vehicle employed by business firms to enhance their customer engagement strategy. The improvement of current services and/or the creation of new solutions can increase the satisfaction of business clients and then strengthen long-lasting relationships between the parties. This trend is also evident in our findings within the case studies.

2.5.2 Moving towards *Servitization* and *Digital Servitization*

The *Servitization* is defined as the process of creating value by adding services to products (Baines *et al.* 2009). The interest toward servitization, implemented by manufacturing firms as part of their competitive strategy, started since the end of the 1980s (Baines *et al.* 2009). Currently, the trend is gaining more attention as new digital technologies, with big data and analytics, are increasing the potential of implementing a service strategy, giving birth to a sub-path (of servitization), known as *digital servitization.*

The evidence and insights from data analytics suggest different ways to enhance customer satisfaction and engagement and, in general, to drive new marketing strategies, as we have stressed in the previous sections, looking at B2B and B2C firms (see *infra* §2.5.1.1 and

§2.5.1.2). In addition, the analysis has pointed out that both business and consumer firms are approaching to servitization and digital servitization, but with different objectives.

While business firms consider the servitization as the core value of their business and marketing strategy, to reach a stronger collaboration and relationship with industrial clients, consumer firms may provide services to enhance the customer engagement strategy and to create a customer experience, but the product remains the core of the offering. This strong difference will be proved along with the empirical research in chapter 3.

In particular, B2B firms are changing their strategic approach and capabilities, with a higher attention to services that has been stressed with the advent of digitalization. This shouldn't come new: business firms have sold services for many time and traditionally "managers viewed services as a necessary evil in the context of marketing strategies"(Baines *et al.*, 2009). Initially, services were considered a mere add-on to products but now there has been a great change in this evaluation. The provision of services is now a conscious and relevant strategy, a differentiating factor into totally integrated products and service offerings (Baines *et al.* 2009). A consumer-centric vision has pushed servitization strategies with the aim to provide not only products but more tailored *solutions*. According to Oliva and Kallenberg (2003), the consumer orientation adopted by B2B firms derived from two elements. First, "a shift of the service offering from product-oriented services to *user's processes oriented services*". This means that now the attention is on the end-user's processes related to the product which need to be effective and efficient. Second, and most important for our discussion, the change occurred in the type of customer interaction, shifted from transaction-based to relationship-based (Oliva & Kallenberg, 2003; Baines *et al.* 2009). The meaning is that B2B firms are more interested in constructing and maintaining long-lasting relations with their client, instead of simply selling them products. The latter shift is related to a change in the marketing approach and objective that we have discussed beforehand.

The literature on servitization highlights three main reasons pushing firms to pursue a servitization strategy, which are: financial, strategic and **marketing** motives.

The main financial drivers recognized by researchers are higher profit margins and stability of income. We want to point out that these financial drivers should be evaluated with care. The challenges in integrating services into the business strategy of a firm are numerous and financial returns are not immediate or to take for granted. For example, problems of cost-effectiveness or controllability of servitization may be obstacles to consider (Coreynen *et al.* 2017). Then, strategic reasons lie on the gain of competitive advantage as services can

differentiate a firm's offerings and are more difficult to imitate. Some authors (Coyne, 1989; Frambach et al., 1997; Mathieu, 2001b; Gebauer and Fleisch, 2007) stress the last point because markets are becoming even more commoditized and a differentiation strategy based on product innovation, technological superiority and low prices is no more sufficient (Baines *et al.,* 2009). Providing services can be a value-add solution increasing the barriers for competitors. Finally, marketing drivers of servitization are based on how services can influence the purchasing process and are generally used (along with traditional products) to enhance the sales. According to Baines *et al.* (2009), this is true in particular for B2B markets where customers are demanding for higher service provision. Services can also enhance customer loyalty and relationship, leading to repeated purchases which intensify the interaction (Baines *et al.,* 2009). This helps firms to understand deeply customer needs and gain insights, useful to create more tailored offerings and value propositions. So, for customers, servitization may enhance satisfaction, delivering more customized and integrated products, which better fit their needs and requirements (Coreynen *et al.* 2017).

With the advent of digitalization, all the opportunities created by servitization strategies have been multiplied and this enables both B2B and B2C companies to offer higher-value services to their customers. Digital technologies are both drivers and enablers of servitization. The process of digitalization gives firms new tools to create and deliver innovative products, connected through the Internet, able to transmit unlimited streams of data and to interact with other products and humans/clients, but it also gives firms the capabilities to develop digital services embedded into digitally-charged products.

The part of literature studying how digital technologies are impacting on servitization is known as *digital servitization* and this is one last trend (brought by digitalization) which is changing the ways of designing marketing strategies (Vendrell-Herrero *et al.,* 2017). Digital servitization strategies deployed by firms have the aim to enhance customer engagement and satisfaction and the value offered to clients, the same a simple servitization strategy can do. But the potential is enhanced with the use of digital tools and data, facilitating the service innovation process for manufacturers, designing more customized services based on data insights and giving to clients exactly what they expect. Digital services that complement traditional products are a new strategic asset, for B2B firms in particular: they are exploiting information coming from their business customers and from the use of products to give higher value-added services and strengthen the relationship with them.

In this chapter, we have defined the development path of Marketing from its early stages, when the concern of marketers was on the economic returns of marketing strategies and on the volumes of transactions, to the current state-of-art, where the impacts of digitalization have shifted the focus to the relationship with customers and to the servitization - digital servitization. The new digital technologies with big data and related tools have changed completely how to think and construct marketing strategies. One technology in particular is challenging firms and marketers, both into B2B and B2C landscape: the Internet of Things. The opportunities lead by IoT are attracting on one side researchers to discover current and future potentialities and applications, and on the other practitioners and businesses which are directly involved in the implementation of IoT technology. In the next chapter, we will focus in depth on IoT and its impacts on marketing strategies. Furthermore, we try to make some speculative hypothesis on how B2B and B2C firms are reacting to this new technology, what is changing in their relationship with the market, considering customers, business partners and value proposition, imagining future trends and opportunities. At the end, we will present four case studies with the aim of proving our considerations and studying which are the main implications on marketing strategies for both B2B and B2C firms implementing the IoT technology.

Chapter 3:

The Internet Of Things and its impacts on Marketing strategy: Some empirical evidence in BtoB and BtoC firms

3.1 Introduction

The process of digital transformation of firms encompasses also the adoption of the new digital technologies we have described in the previous chapters. One of these technologies is gaining additional interest among academics and businesses, due to the potential applications and promising opportunities: the Internet of Things (IoT). In this chapter, we will analyze the phenomena of IoT devices, challenges and strength points, sectors of application and how they are employed by B2B and B2C firms. The aim is to understand the main impacts on marketing strategies and how the IoT implementation is changing the firms' approach to the market. The chapter is organized as follow: in the second section, we will define the Internet of Things and the most promising areas of application. We will focus, in the third section, on the challenges and opportunities of IoT projects and in the last part of the chapter we present the case studies in BtoB and BtoC markets. Thanks to the empirical cases, we want to find confirmation of our assumptions relative to what impacts the IoT technology is creating in the development of marketing strategies both in business and consumer firms. These hypotheses find their theoretical support in the last part of chapter two and in the current one.

3.2 Defining the Internet of Things

The last years saw a surging interest in the Internet of Things technology and potential applications. Consortia have been appointed to set the frameworks and standards for IoT and companies have started to introduce numerous IoT-based products and services (Wortmann & Flüchter, 2015). The Internet of Things currently represents a real business opportunity and IDC (2013) expects the worldwide market value for IoT to grow to 7.12 trillion by 2020. The ever-increasing attention to IoT technology and how to gain from its use is clear, but a unique or common IoT definition is not easy to set.

The term "Internet of Things" was firstly introduced by Kevin Ashton to define the way to create an IoT by "adding radio-frequency identification and other sensors to everyday objects" (Ng & Wakenshaw, 2017). But the concept and technology itself can be date back of 20 years and is attributed to the work of the Auto-ID Labs at the Massachusetts Institute of Technology (MIT) on networked radio-frequency identification (RFID) infrastructures

(Wortmann & Flüchter, 2015). After that, the Internet of Things vision and field of application have gone beyond the simple RFID technologies.

It is possible to find several definitions of IoT in the literature. Changing the scope of application and the point of view, we have found:

- Technological definitions, based on the technological components, software, hardware and IT infrastructures (Lee & Lee, 2015);
- Definitions that give importance to the relationship "IoT-Big Data" and related challenges, such as the storage, search and organization of large volume of data (Wortmann & Flüchter, 2015);
- Definitions based on the things interconnected through the IoT, the one that most fits our aim and viewpoint as it comprises all the previous ones (Krotov *et al.,* 2017).

According to the last definition by Krotov *et al.* (2017), the IoT is presented from a complex, socio-technical perspective. In this framework, IoT is defined as a network composed of several nodes from the technological and physical to the broad socioeconomic environments (Krotov *et al.*,2017).

3.2.1 The Physical, Technological and Socioeconomic environments of IoT

The physical environment encompasses human and nonhuman objects connected through a wireless network that enables the interaction between these objects and the physical environment surrounding them (Krotov *et al.*,2017). Examples of human objects are people directly interacting with the IoT with the help of different wireless devices, such as smartphones, health tracker etc. Conversely, nonhuman objects are physical devices such as cars, which can be also connected with IoT devices and transmit data (Krotov *et al.*,2017). Both human and nonhuman elements of the overall IoT landscape are embedded into a physical environment like a room or home, an office building, a city etc, and it can be viewed as connected to the IoT as well. For example, a smart home can have a heating system connected via Wi-Fi, and it can sense other objects, such as the smartphone of people living in that home. The heating system can interact and receive the GPS signal from smartphones, thus, when people are close to the home, the heating system can activate itself and warm up specified rooms.

Then, the technological environment is composed of all the technological components, from software and hardware to data and digital platforms, which allow the correct mode of operation of IoT infrastructure. The most important elements inside the technological

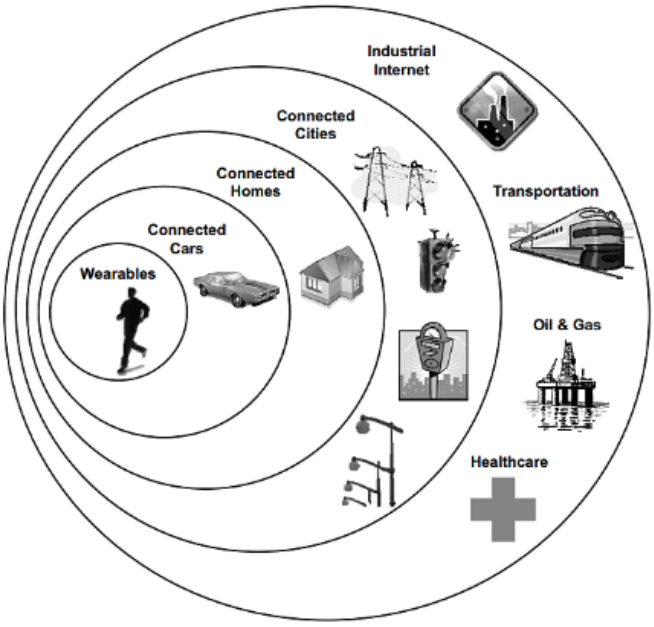
infrastructure are the data generated by IoT objects (Krotov *et al.,* 2017). As we have explained in defining the main sources of Big Data, IoT is a promising source with great potential for firms. In fact, depending on the type and scope of IoT application, data can suggest insights on: location, temperature or other environmental characteristics, resource consumption (Krotov *et al.*,2017). Additionally, IoT objects can transmit data related to: the usage, recurrent problems, the necessity of maintenance of the connected products. It all depends on the field/sector of application and a specific analysis will be presented later on, to clarify how many data type can be gathered and transmitted using IoT technology.

The socioeconomic environment is the last element included in the IoT landscape, and a series of stakeholders are part of it. Firstly, we have entrepreneurs and business leaders, which invest in IoT technologies to reach a competitive advantage and enhance their business performance (Krotov *et al.,* 2017). Second, but central for the IoT success, are targeted customers. Smart products with IoT embedded technology can be developed for both business or physical clients, with the common aim of collecting environmental or performance data, relevant for improvements in the strategic planning (Rowe, 2017).

The IoT landscape, including all the elements we have previously introduced, can be applied in different business sectors, both public and private. The most prominent areas of IoT application are as numerous as they are different (Wortmann & Flüchter, 2015). IoT solutions are expanding to virtually all areas of everyday life and we have identified five mainstreams (Nguyen & Simkin, 2017; Wortmann & Flüchter, 2015; Miorandi *et al.*, 2012, Chang *et al.*, 2014, Aztori *et al.*,2010):

1. Smart industry, where the development of smart production and connectivity within the firm is part of the Industry 4.0 and Industrial Internet of Things, which we consider a sub-stream of general IoT;
2. Smart city and public areas;
3. Smart home, offices and building area;
4. Smart health domain;
5. Personal and social domains.

Figure 8: IoT areas of application (source: Abashidze & Dąbrowski, 2016)



We have introduced in the first chapter a description of Industrial Internet of Things and its application under the heading of Smart Industry - Industry 4.0. In this chapter, we aim to focus on the Internet of Things in the other sectors of application to give a complete overview/framework.

3.2.2 IoT in Healthcare and in the Personal-Social Domains

The Internet of Things can find several applications in the healthcare sector. An example is the potential deployment of IoT devices and sensors in hospitals for assisted living solutions. The related issue of personalized health-care and well-being solutions, where we find the *wearable devices,* is even more interesting for our analysis. These are objects connected with a personal computer or mobile phone apps, which are able to track and monitor daily activities of people, such as steps walked, calories burned, heartbeat, location and many other features related to a specific activity done (Miorandi *et al.,* 2012). All these information are personal and individual and can be exploited by firms for their strategic objective. This field of application is strictly related to the *personal and social domain* (Aztori *et al.,* 2010), which regards the link between IoT technology and people's life and relations. More generally, we can think about social networking applications or to IoT sensors used to track losses and thefts (Aztori *et al.,* 2010). In the last cases, it is possible to implement an IoT infrastructure to monitor the location of a thing that we do not remember where has been left, or simply to find the right position of it, as we can do with cars. Additionally, it is possible to use the IoT

technology to know if some connected objects are moved from a defined area, alerting on the potential theft of these things (Aztori *et al.,* 2010).

3.2.3 IoT in Smart City and Smart Home

The term "Smart City" is used to identify cyber-physical urban environments where the implementation of ICT infrastructure and the provision of new advanced services are enhancing the quality of citizens' life (Miorandi *et al.,* 2012). IoT applications are enabling smart city initiatives worldwide (Kim *at al.,* 2017) and IoT can find numerous applications. The necessity to implement this technology in urban and public areas comes from the projection of an exponential increase of world population, most of which is going to live in cities. Along with this growth, innovative solutions are crucial for improving productivity, reducing the management costs (Khatoun & Zeadally, 2016), and for managing in intelligent ways the resources, avoiding any waste. According to Khatoun & Zeadally (2016) "cities' demographic, economic, social, and environmental conditions are the major reasons for the dramatic increase in pollution, congestion, noise, crime, terrorist attacks, energy production, traffic accidents, and climate change". This situation can be improved with the deployment of information and communication technologies, implementing IoT solutions. IoT applied to smart cities can increase the benefits and quality of life in two particular areas (Khatoun & Zeadally, 2016):

- Environment and transportation;
- Safety and security.

For what concern the first domain of the e*nvironment and transportation*, we have several examples of Internet of Things applications which can optimize the physical city infrastructures, for instance with the provision of advanced traffic control systems or smart parking device systems. The first is thought to control the car traffic in big cities and give advice for alternative routes in order to avoid congestions (Miorandi *et al.*, 2012). The latter system can help drivers to find parking spaces and monitor the availability and prices, thus improving the mobility in the urban area. In smart cities is possible to develop IoT solutions for intelligent lighting of streets or for the noise control (Wortmann & Flüchter, 2015). Additionally, sensors can collect data about the pollution in the air, where it is most concentrated and its level. In the second area of *safety and security*, IoT can be applied in forensic settings for security aims (Miorandi *et al.,* 2012). This encompasses surveillance cameras, enhanced emergency response services, and automated messages for alerting citizens (Khatoun & Zeadally, 2016).

The second prominent domain in IoT technology application is the *Smart Home and Building areas* where intelligent thermostats, washers/dryers connected through Wi-Fi for remote monitoring, and security systems are gaining a lot of attention (Nguyen & Simkin, 2017; Wortmann & Flüchter, 2015). These are only a few examples of IoT devices installed to home/building objects, allowing them to communicate and interact. Detection and control devices are installed in smart homes in order to automate and remotely control potentially all aspects inside the building, from the heating and air conditioning systems, to the lights, roller shutters and sunblind (Alaa *et al.,* 2017). These advanced systems generally have a user interface that interacts with a smartphone, tablet or computer and the network connectivity is managed by the IoT (Alaa *et al.,* 2017).

Main reasons for instrumenting home and buildings with IoT technology are related to:

- Reduction of resource consumption, such as electricity and water, and improvement of people satisfaction (Miorandi *et al.*, 2012);
- Cost reduction thanks to an efficient energy management (Alaa *et al.,* 2017);
- Entertainment and comfort of residents (Alaa *et al.,* 2017).

Positive effects are both economic, with the reduction of expenditures, and societal, thanks to a minor waste of energy and vital resources (Miorandi *et al.*, 2012).

In the five areas of IoT application, we have found important advantages both for customers employing these technologies and for firms and their business performance. In general terms, we can identify specific opportunities in Internet of Things application for each area, while the challenges are general and tied to the technology itself, so, common to every field of application.

3.3 Challenges and Opportunities in IoT application

All the opportunities offered by IoT technology come from the data collected and the use firms are able to do, transforming the insights into actions. Data coming from IoT sensors transmit different information and, once analyzed, can suggest different strategies, with respect to the area of application (we refer to the five areas described beforehand). According to Lee & Lee (2015), three main areas of IoT data application can be identified. They are related to how firms can use the data gathered from the IoT sensors:

(1) monitoring and control;
(2) big data and business analytics;

(3) information sharing and collaboration.

Monitoring and Control refer to the ability to collect data about product performance, energy usage and environmental conditions and make possible for managers or automated controllers to monitor constantly what happens and take real-time decisions. In this context, technologies applied may be the grid and smart metering which can "reveal operational patterns, spot areas of potential improvement, or predict future outcomes and optimize operations, leading to lower costs and higher productivity" (Lee & Lee, 2015). An example of this application is in the *smart home* and *city* as we have seen beforehand. The control power of IoT devices is touching also the *Automotive* sector, in particular cars and some components inside, with the prospect of giving more and more customers' personalized experience and satisfaction. An example is about a project developed by Ford and Intel in conjunction, which have worked on a system able to personalize the in-car experience of users. Based on advanced recognition software and smartphone app, is possible to do a face recognition and adjust some driving features depending on who is driving, and to improve privacy controls. Then other in-car commands are customized like the display of driver's calendar, contacts or music, synchronized with the user of that moment.

Big data and business analytics systems encompass the enormous amount of data generated by connected things which are transmitted to the business analytics tools of firms. In this context, the scope of the analysis is in the improvement of the decision-making process of managers. Data can suggest new trends and opportunities in the market or changes in consumer behavior/preferences giving the chance to marketers to adjust and improve their product and value-added services. This allows enhancing the customer satisfaction and the loyalty to the company. This type of data and the objective of analysis are largely applied in the domain of *healthcare, personal and social areas,* with examples that come from our daily life. Think again to the devices with embedded health monitoring systems, that allow gaining lots of individual and personal data giving firms the possibility to develop more and more customized services and app and products, to satisfy hidden needs that we, as customers, have not defined yet. This is an enormous power in the hands of manufacturers and service providers as they can literally know everything about their actual and potential customers, at every time and location.

Information sharing and Collaboration is another branch in IoT data application that can be useful to implement business performances and experience. Information can be shared between people and things or among only things. The supply chain is an example of a firm

area that can really gain from this, avoiding information delay and distortion. The share of information can also be a powerful instrument to enhance the business relationships in the value chain and/or firms network. For instance, firms can package their data analytics insights for commercial clients (Ransbotham & Kiron, 2018), enhancing the sense of collaboration and strengthen the loyalty and ties among business firms.

On the other side, the challenges in implementing the IoT technology and data analysis are not simple to face and can represent a hurdle in developing IoT solutions for enterprises. Main challenges can be identified in business and technological fields (Table 2) and are common to every area of application (Wortmann & Flüchter, 2015; Lee & Lee, 2015; Alaa *et al.*,2017).

Table 2: Main challenges in the IoT adoption (source: Wortmann & Flüchter, 2015; Lee & Lee, 2015; Alaa *et al.*,2017)

Technological field challenges	**Business field challenges**
- Data management; - Data mining; - Lack of professional figures; - Device connectivity; - Security and Privacy concerns.	- Business model adaptations; - All the business functions need to be re-shaped and re-aligned.

From the **technological viewpoint**, firms have to consider how billions of connected devices are going to put pressure on their ability to get, store, process and analyze data (Pettey, 2018). As reported by Ted Friedman, vice president and distinguished analyst at Gartner, within 2019 “one-third of IoT solutions will be abandoned before deployment due to lack of data management and analytics capabilities adapted for IoT” (Pettey, 2018). The fact is that current data centers are not prepared to deal with heterogeneous data generated by IoT devices, from both people and enterprises. In addition, the investment in architectures able to store the ever-increasing amount of data is a barrier as well (Lee & Lee, 2015). The risks are for huge data losses, due to problems in data management and transmission (Alaa *et al*, .2017).

Data mining procedures are affected by the larger amount of data available but are necessary to process and analyze them. IoT devices collect unstructured and heterogeneous data, related to temperature, location, movement, vibration, the environmental situation around, and so on (Lee & Lee, 2015). Data mining techniques help to extrapolate insights and information in a consistent way from all these available data. The aim is to improve the decision-making process for managers, but traditional data mining techniques need to be adapted for the analysis of new digital data (Lee & Lee, 2015). Anyway, as we have stressed in chapter one

while analyzing the Cloud computing technology and its opportunities, the data management and mining problems are going to be overcome with the development of cloud platforms and related services. These solutions allow to use a common working environment with applications, storage capacity, hardware and services, as a virtual solution that resides over the cloud, regardless of operating system or type (Dumitru, 2017).

Problems in data management, transmission and analysis can be generated also by connectivity problems in the IoT devices. For instance, consider some devices connected through the Wi-Fi: once the connection is not solid it is possible to lose contact with the device and then invalidate the data collected and transmitted. Or it is possible that some IoT devices depend on batteries: in this case is necessary to find an efficient technology for the connectivity that will not impact on the battery duration, such as the Low Energy (LE) Bluetooth (the last two experiences come from two of our firms interviewed for the empirical case studies). Then, communication problems can occur among different devices from manufacturers and firms, which use diverse technologies and standards (Alaa *et al.,* 2017). Along with these challenges, the recurrent one we have stressed so forth, is the lack of professional figures, analysts in general, able to understand the trends in data and to convert them into profitable actions.

Challenges related to security and privacy are becoming a priority for organizations centered on a big data culture. Security risks increase with the complexity and distribution of IoT solutions, which represent a more attractive "attack surface" (Pettey, 2018; Lee & Lee, 2015). IoT devices may raise security threats due to insecure web interfaces, lack of software protection or insufficient authorizations, or lack of transport encryption (Lee & Lee, 2015). As IoT devices are collecting more personal and individual data, which are highly valuable for firms but also sensitive, a present risk for enterprises is tangible: they need to manage data in the right manner from a privacy, retention and quality perspective (Pettey, 2018). From a privacy perspective, customers may not be happy to share some personal information with firms, and this is counterproductive as IoT data analysis can improve customer satisfaction and life's quality (Lee & Lee, 2015). Companies need to find new ways and value propositions to reward clients if they share data with them. For some firms, this is a strong barrier, for others is not. In the latter case, managers think that privacy concerns, in current days, are no more a problem and clients will share them as they understand the potential and how the subsequent actions developed by firms can improve customers' life and satisfaction. As we'll see in a following section (see *infra*, §3.4.2.1), this is a perspective of one firm we interviewed in our case studies. In general terms, security issues related to privacy ones can be

a barrier in IoT adoption, both for firms and customers. What is important is to train IoT developers to incorporate security systems into IoT devices and encourage customers to use them: in this way, data are ensured to go only in firms hand and no under hackers' attack that is the real concern for privacy issues (Lee & Lee, 2015).

From a **business viewpoint**, other challenges have to be considered, all related to a general re-organization of firm functions and inter-functional relations. This is what we have defined as changes in the *business culture*, going toward a Big Data or, more generally, a *digital culture* (Shaughnessy, 2018; Kate *et al.* 2017). For example, at the operational level, the introduction of new hardware and software cultures within the IoT project, start to be part of the process at the early stages of product development. Data analysis impact on the updates/releases of next product generation: as new information from users is collected and analyzed, improvements in the product development are made. New services may be added, both for product and customers, to enhance the satisfaction and strengthen the relationship with them. Consequently, the Pre-sales and After-sales functions need to be re-aligned to meet the requirements of connected products. The marketing function can be shaken with the development of new tools as IoT products and related services which can change the way firms interact with the market (Wortmann & Flüchter, 2015). As we can infer from the described business changes, they are all related to the introduction of new technologies and techniques along with the development of an IoT project. Thus, when investing in the Internet of Things both technological and business challenges will come together as they are tied one to the other.

All the changes related to the use of the Internet of Things, lead companies to rethink their business strategy. They have to consider opportunities and threats of IoT projects, how this can impact on the organizational level and on all the functions inside. As a result, firms have to adapt or re-align the business model with respect to the new positioning of products in the Internet of Things and reconsider the boundaries of their industry and competition (Wortmann & Flüchter, 2015).

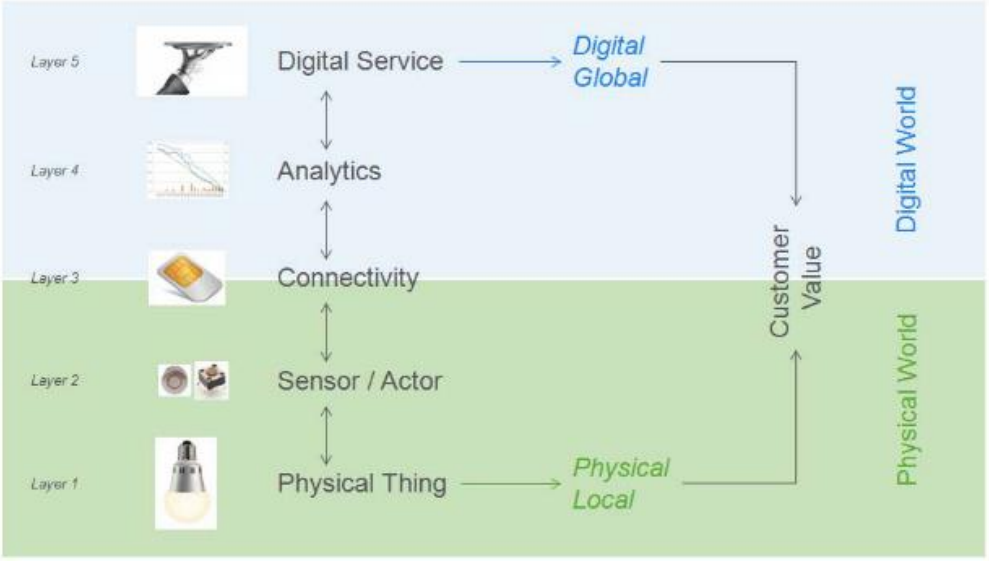
3.3.1 IoT and Business Models

In the first chapter, we have introduced the concept of Business Model Innovation (BMI), which is an unavoidable consequence as firms are going through a digital transformation process. In this section, we want to consider the implications on business model coming from IoT projects.

Business models express how firms create and capture value through the interaction with their environment (Sánchez-Montesinos *et al.,* 2018). In the framework of digitalization and new digital technologies, firms need to understand how the landscape is changing and how to adapt their business model to new innovative ideas or technological disruption. That is why a Business Model Innovation is necessary to deal with new customers' needs, reshaping the nature of existing product or services, delivering new value propositions and building new relations with clients, partners and suppliers (Sánchez-Montesinos *et al.,* 2018). As IoT solutions spread, the implication for BMI becomes relevant (Hui, 2014). The Internet of Things makes possible to create hybrid solutions, putting together physical products and digital services (Fleisch *et al.,*2014), so firms need to re-evaluate the traditional concepts of value creation and value capture.

The concept of *value creation* is the heart of any business model and is about the performing activities which enhance the value of a firm's offering and attract customers. In traditional business models, the value creation is realized with the identification of consolidated customers' needs and then, based on these needs, the creation of common solutions (Hui, 2014). The IoT-based value creation is more innovative and can follow on a regular basis customers' preferences and behaviour, creating products with features and functionality pushed by customers. IoT data collection and analysis allow to forecast patterns and create optimization models, increasing the potential of value creation process (Hui, 2014). With the IoT, the different stages of value creation necessarily merger digital and non-digital elements. A practical example taken from Fleisch *et al.* (2014) can be useful to understand the meaning of IoT-based value creation (Figure 9).

Figure 9: IoT-based value creation and its layers (source: Fleisch *et al.* 2014)



The first layer refers to the *Physical Thing,* which is a LED light bulb in this example. The benefits created by the physical things are direct and immediate, such as the illumination of a room. The traditional business model for a light bulb is well-known by manufacturers and is tied to the satisfaction of an enduring need: create comfortable environment thanks to the light (Fleisch *et al.*, 2014)

The second layer is created with *Sensor / Actor,* where the physical object is embedded with sensors and actuators. Sensor technology collects data from the surrounding environment (a room in this case) and actuating tools deliver the service that generates the benefit. For instance, sensors installed in the light bulb can detect the presence or not of people or animals in the room and then, the actuators will switch on/off the light, based on when someone enters/exits the room. In this layer, the benefits perceived and delivered are still tied to a local environment.

In the third phase, the *Connectivity* is added and the technology described in the previous layer is now globally accessible. In our case, the connected light bulb can be accessed worldwide and the owners can know about its status, energy consumption, if it works well or not, with the support of an easy user-interface on a smartphone's app for example. What we have described in the last sentence is already part of the fourth layer: *Analytics.* Sensors data are collected, stored and analyzed to find relevant information about on-and-off times or operating hours of individual light bulbs in the household (Fleisch *et al.*, 2014).

The last layer is maybe the most important when considering the impacts of IoT on business model and value creation: *Digital Service.* The features of the precedent layers are packaged and delivered to customers in a suitable form as an overall digital service (Fleisch *et al.*, 2014). Or, in a more general case, it is possible to create and add new digital services to the physical thing. The need for digital services may be found after the analysis of data as a means to increase the customer satisfaction and enhance the strength of relationship.

What is important to understand is that each phase in an IoT-based value creation is interdependent, that is why in Figure 9 we have bi-directional arrows. This means that the real value creation of IoT is based on physical products, that may exist also in the past, which are now upgraded with digital tools (from the second to the fifth layer in the model above) (Fleisch *et al.*, 2014).

As we have seen for the value creation, also the *value capture* concept need a new firms' mindset. The value capture encompasses the ways to extrapolate and monetize the customer-

value delivered. In traditional business models, it is as easy as to set a price to maximize the profits with respect to the product's sales (Hui, 2014). But within the IoT landscape, capturing the value is not limited only to the simple sale of products. In fact, the development of value-added services, digital services and apps becomes a new driver for increasing the initial product value (Hui, 2014). The challenge is to let customers understand this new concept and what they are paying for, creating *new value propositions*. This is not trivial and represent an important issue to evaluate when developing IoT products and related business models. All of our interviewed firms are currently facing this challenge.

The impacts of Internet of Things on the business model innovation represent how firms are changing their approach and relation with the market, due to the employment of IoT solutions. In the next section, we will focus on how IoT technologies are re-shaping the business function, which is responsible for the relationship between the firm and the market: the marketing function and its strategies. Capitalizing on the literature we presented in this chapter and in the second part of chapter two, we are able to formulate our personal hypothesis on how the Internet of Things is going to change the following areas:

- firms' interaction with customers, partners and suppliers;
- products and services development processes and the ways to satisfy customers and strengthen the relationship with them;
- new value propositions design.

Those hypotheses will be discussed at the end of the work by using the empirical evidence of the case studies we are going to present in the following section.

3.4 The impact of the Internet of Things on Marketing strategy: Empirical case studies

In chapter 2, we have reviewed the development path of marketing thought since the beginning to current days, which are dominated by a digital and technological revolution. The process of digitalization of firms has strongly re-shaped organizations and the way of doing business. Everything starts with Big Data and the main sources of them, among which we remember a prominent source: the Internet of Things (Yaqoob *et al.*,2016). Beforehand, we have distinguished the most important domains where IoT is gaining additional interest and performance. According to our aim, we make another distinction between B2B and B2C areas of IoT application. This is simply a different point of view of the previous classification, as IoT devices are developed both in business and consumer markets and can be implemented in

one or more of the areas defined above. For example, B2B firms can design and sell a smart product which will be installed in the smart home or city. Conversely, we could find B2C firms developing health-care wearable devices or other IoT products for the personal and social domains. Anyway, in our opinion, the concepts of BtoB and BtoC firms and markets are not easy to define in a strict and unambiguous way. For this reason, in the next section, we introduce the respective definitions of business and consumer firms, used to support our discussion.

Considering the distinction between B2B and B2C markets, in chapter two, we have identified two areas that are gaining additional attention since the process of digitalization of firms has initiated: the *customer engagement - relationship* and the *servitization (including digital servitization).* The Internet of Things is driving both B2B and B2C firms towards these two paths, with the definition of new marketing strategies. But the respective implications are different as the two markets are different as well. In this section, we analyze where the IoT projects are driving business and consumer firms and how IoT data impact on their marketing strategies. We will make some hypothesis which will be confirmed or not with the empirical case studies.

3.4.1 The empirical research: purpose and methodology

The aim of our case-study research is to understand which are the main opportunities and threats faced by firms, based in Italy and involved in IoT-related activities, and which are the functions that benefit most from this technological investment. We want to analyze and understand how IoT technology is changing organizations in terms of culture, business model approach and marketing strategies in particular.

The basic idea we want to support is that B2B firms investing in IoT technology, are more incentivized to collect and exploit IoT data to develop personalized solutions, providing more services related both to the product (SSP) and to the client (SSC). Thus, to gain a competitive advantage, industrial firms must be proactive in developing a service strategy tied to their traditional offering, but also considering the ever-increasing customers' expectation, with a service solution created for them (Mathieu, 2001a). In this way, business firms try to enhance and strengthen the quality and duration of their *customer relationships,* moving toward a Servitization and Digital servitization strategy.

On the other side, B2C firms invest in IoT sensor-products with the aim to use and analyze data which can give them insights to bolster their *customer engagement strategy*. This is

possible through a higher personalization, with the optimization of the marketing mix strategy and in particular by surrounding the product with a real *customer experience*. The *experience* is created with services and digital services added to the connected product, both during the purchasing decision process and when using the product. Thus, B2C firms mainly provide SSP and SSC to enhance the sales, but the product remains the core of the IoT project, to attract and satisfy customers.

With the empirical research, we want also to find a validation of one concern pinpointed by researchers in the literature on digitalization and IoT technology (Rowe, 2017; Erevelles *et al.*,2016; Pearson & Wegener, 2013): the profound lack of specialized professional figures, in particular in Italy, who can deal with the technological disruption. Data scientists and related figures are rare to find and if found it did not mean they are reliable and really capable. Lack of field experience and past affiliate cases to take as examples are not easy obstacles to overcome.

We have decided to present six *propositions* which find proofs in the IoT literature and that we want to examine with our case studies. These propositions analyze the impacts the Internet of Things has on the marketing strategy of firms, from direct to indirect consequences:

Hp.1 B2C firms investing in IoT smart devices are collecting data to improve the current offering or to create new ones, including the possibility of personalization or customization. Data analysis can be used in particular to create a *customer experience* around the product (Ransbotham & Kiron, 2018; Wedel & Kannan, 2016; Chang *et al.*, 2014; Pearson & Wegener, 2013)

Hp.2 B2B firms investing in IoT technology are collecting data to enhance their service and digital service strategy, with the fundamental aim to strengthen their *customer relationship* (Baines *et al.*, 2009; Oliva & Kallenberg, 2003);

Hp.3 B2B and B2C firms need to develop a *new value proposition*, able to transmit the real value of the IoT product and to justify the increasing costs (Berman, 2012);

Hp.4 Security and privacy concerns are gaining even more attention and customers are found resistant in adopting related apps or similar to benefit from the IoT product (Pettey, 2018; Lee & Lee, 2015);

Hp.5 One main obstacle while investing in IoT projects is the *cultural change* required, along with the financial hurdle (Shaughnessy, 2018; Kane *et al.*, 2017; Lee & Lee, 2015);

Hp.6 IoT landscape necessitates professional figures able to handle with the technological infrastructure and the data analysis: at the initial stages firms find more suitable to create partnerships with experienced IT firms or consultants rather that create internal dedicated teams (Rowe, 2017; Erevelles *et al.*,2016; Pearson & Wegener, 2013);

For this analysis, we have designed an empirical research based on a cross-analysis of multiple case studies. This methodology is in line with the most important literature in case-study research (Eisenhardt, 1989; Yin, 1994) and instead of depicting a statistically representative sample, we follow the nature of an empirical research that is to design a representation of a variety of situations, opportunities and challenges for companies based in the north-east of Italy from the above defined IoT revolution. Following this line, we have selected four potential case-studies, all Italian-based large, consolidated and international firms, from different industries and with differences in the marketing relation model and position in the value chain (Table 3).

Table 3: Firms outline: static situation (source: our chart)

Cases and Categorization	**Activity**	**Size / Revenues (€Million, 2017)**	**Value Chain position**	**Marketing Relation model**	**Interviewee position and interview duration (minutes)**
Firm A – B2C	Sport apparel	180	Downstream	Consumer	Electronics Development Manager – 90’
Firm B – B2C and B2B	Coffee roasting	470	Downstream	Business and Consumer	Design Engineer (Product Development) – 50’
Firm C – B2B	Heating technology components	600	Upstream	Business	Business Unit Director Development and Technology Integration – 100’

We decided for a sample which can be representative of the north-east Italian area, selecting firms from Treviso and Trieste provinces, all of them with an international base because our idea is that only financially-consolidated enterprises with a strong headquarter can face the huge financial contribution required by a digital investment. As said before, the companies are both B2B and B2C. The two markets are not easy to define in current days, as the value chain where firms are committed are very long and complex. Traditionally, (pure) *business-to-*

business is referred to interactions that occur between organizations, where a firm's offering is mainly thought for the satisfaction and consumption by other businesses or as part of the production process of other firms (Lilien & Grewal 2012, p.3). Today the concept has been broadened, including the value-generating relationships between organizations where there is a mutual benefit. On the other side, (pure) *business-to-consumer* definition refers to the final interactions between the firm and individual customers, where the offering (both products and services) is developed to answer the specific needs and preferences of physical end-users (Lilien & Grewal 2012, p.3).

The problem in setting a strict definition for B2B and B2C firms is that, while analyzing the real business cases, and particularly as regards firms involved in digital transformation processes that use extensively IOT/cloud/data solutions and platforms, it is hard to find a firm that acts purely and univocally as BtoB OR BtoC. This means that industrial firms generally build the core offering for the satisfaction of other business firms, but they may attempt to develop an offering to capture also the end-users. For instance, with the Internet of Things, data collected from smart objects generally come from the end-users, pinpointing specific insights related to both the client and to the product. B2B firms employ and analyze those data to improve the offering and marketing strategy for their direct clients (business firms) but, depending on their position in the value chain and their sales/marketing power, they can also reach the final clients (individual customers).

For the reasons explained above, in our opinion, it is more suitable to talk about a continuum line where B2B and B2C pure definitions and marketing strategies are at the extremes, and, in the middle, a pool of unlimited and *hybrid situations* exist. Thus, following the aim of our discussion, we cluster the empirical cases under our analysis into B2B and B2C cases considering specific criteria, that are used as vertical and horizontal axes of Figure 10, laid at the end the case-studies discussion.

The first element considered for the classification (vertical axis), is the *position in the value chain*, which tries to reflect the position of the firm with respect to the end-users, thus where it is positioned in the supply chain. At the *Upstream* extreme we find firms with several other utilities in the middle, so generally positioned far away from the end-user. The *Downstream* extreme reflects firms which have direct transactions with the end users, such as retailers. This criterion is important when introducing the IoT because the data generally come from the final customer in the value chain, so the nearer is the firm to the end-users the easier may be the development of marketing strategies for them.

The second element, on the horizontal axis, reflects the firms' *marketing relation model*, which could be *business or consumer*. This criterion refers to the main type of interactions developed by the firm, if more business or consumer interactions, and tries to reflect the traditional distinction between B2B and B2C markets explained beforehand. At the extremes, we have *pure* business and consumer firms while, in the middle, all the hybrid solutions. The marketing relation model is relatively important when we introduce the Internet of Things and data. In fact, data collected from the IoT product can be used to develop marketing strategies for both business or consumer clients.

Under these premises, it is possible to talk about a distinction in the marketing strategies deployed by the two types of firms, in particular when developing IoT solutions. Thus, in our discussion, we consider as B2B those firms implementing an IoT data analysis mainly to perform a marketing planning for their direct business clients (other manufacturing, distribution and service firms). Conversely, B2C firms will be considered those using IoT data mainly to improve the marketing strategy for end-users of the smart product. These criteria are important as our aim is to define the impacts that IoT technology and data have on firms' marketing strategy.

The definitions above allow us to position our empirical cases in one or the other categorization (B2B or B2C) and pursue the aim of our discussion. Anyway, according to what we have defined as the *B2B-C continuum* and the existence of *hybrid* situations which are more representative of the real business strategies, we present in Table 3 a *static classification* of our B2B or B2C cases (see column "Cases and Categorization"), while in Figure 10, we represent the *dynamic state*, that is where our firms are going with the development of hybrid solutions for their marketing strategies. Along with the case studies, we will be more clear.

For this empirical research, firstly we have structured a questionnaire with the aim of collecting general data to depict the firm setting, industry, way of doing business and type of IoT application. Through the questionnaire, we would also find the stage of digital transformation of the company and understand the main concerns in the IoT implementation. After that, we managed to organize in-depth semi-structured interviews (lasting from 1 to 2 hours) with firms' knowledgeable key figures, that is middle or top managers involved in the IoT-related activities, to thoroughly analyze some of their answers to the questionnaire. All the interviews have been recorded and we combed through 240 minutes of total records. In

this way, we manage to have written texts, with all the notes and direct experiences in the IoT project development, to compare and discuss.

3.4.2 How IoT technology and data are changing the B2C marketing strategy

As anticipated beforehand, we categorize in the B2C setting those organizations which are collecting IoT data and use them to improve the marketing strategy focused to end users. Under this framework, it is possible to define how B2C marketing strategies are impacted by the IoT implementation.

The data gathered and transmitted by IoT devices are individual, related to the final user of the firm's product. We can have examples in healthcare, personal and social domains, but also in the automotive sector. IoT data can suggest a lot of information about the client and how he or she uses the product. Just to have an idea about the kind of data transmitted to firms in a B2C context, we can take as an example the automotive sector and cars in particular. Woodside & Sood (2017) present the Tesla car case, which is an IoT all-electric vehicle with an advanced bug report feature. This is like a "black box" in the car that collects not only information about the bug, but also all big data related to the user, inclusive of geo-location, energy consumption, state of suspensions and car driving patterns. These IoT data are related to both the product (car) and the user, and provide marketers with two key opportunities (Rowe, 2017). First, data empower companies with "real-time focus groups, product feedback, and information" that can "save them millions of dollars in research and development and speed up time to market for new products." Second, data provide companies with a lot of information about product usage, consumer behavior/preferences, and sales, that can be used to enhance the *customer engagement strategy*.

As we have defined in chapter 2, the analysis of IoT data empowers B2C marketing strategies in the following main aspects (Philip Chen & Zhang, 2014; Chang *et al.*, 2014, Pearson & Wegener, 2013):

- Improvement of the current offering and/or creation of new products;
- Personalization and customization of the offering;
- Improvement of the overall marketing-mix strategy;
- Creation of a *customer experience* around the offering with the help of value-added services and digital services.

This is summarized in our first proposition and we will look for confirmation in our B2C case studies: Firm A and B. The first one, Firm A, is developing an IoT solution for the Sport

clothing sector with a smart safety wearable system, while Firm B is engaging the market of coffee machines, introducing a connected machine for domestic use.

3.4.2.1 Firm A and the case of safety wearable system for motorbikes

The first case study we are presenting, called Firm A, is a firm working in the Sport clothing sector, mainly designed for motorbikes, for which our interviewee is the Electronics Development Manager. This case has been categorized in the B2C setting because its marketing strategies for the smart product we will describe, are mainly designed for the individual customer – biker, on the basis of data coming from the IoT product. This is the *static* representation of Firm A.

The business size of this firm is not as extended as it is for the other case studies analyzed (cf. Table 3), but it is definitely comparable with the size of its main competitor. This element will be considered when we will go through the cultural/organizational and financial considerations as defined in our Hp.5. The IoT product is a wearable protection system for motorbike impacts. The system has a local intelligence, embedded in a microprocessor, where the data are collected through sensors applied in strategic positions on the wearable protection. The safety system is not connected yet, thus, there is not a continuous flow of data from the product to Firm A. When there is a crash/impact that requires the service support, Firm A can download the data collected in the abovementioned micro-computer. These data are related to the biker's driving patterns and, in particular, to the happened crash/impact. In the next future, they project to add the connectivity in order to have a continuous stream of data from the safety devices, with the additional possibility to collect information related not only to the motorbike but also to the driver. With respect to its industry, Firm A is a *market leader* at the avant-garde with the development of the described solution. Currently, the most important objectives in the data collection and analysis are:

- Improve the product without lowering the *safety* for drivers;
- Find, understand and solve the main problems related to the product and its usage;
- Create an IoT solution to differentiate the product.

The IoT technology applied to the safety system is thought to be the *differentiating feature* which will encourage customers to buy Firm A's product because "it is the best for motorbike safety". The real concern for Firm A is communicating the differentiating value, why customers are paying an additional price for this product, compared to non-IoT solutions, and make them understand the technology behind, with a new *value proposition.* This challenge

has to be evaluated with respect to the targeted market that, for Firm A, is composed by professional bikers with a specific economic power and passion for motorbikes – thus with a potentially high willingness to pay. The price positioning is not strongly impacted by the IoT if compared with the main competitor's alike offering. Thus, the new value proposition needs to communicate the *differentiating value* brought by the IoT technology which should lead customers to prefer Firm A instead of other competitors. The innovative technology is not visible while purchasing the safety system and combined jacket, but justifies the additional costs to pay respect to not-connected solutions.

Firm A sees the future opportunity to develop a dedicated app connected to the product, as an additional vehicle in the data collection. The foreseen challenge is to involve customers in utilizing the app. As stated by Firm A's Electronics Development Manager, customers may be reluctant in using the app and give their own data to the firm, but it should not be a great problem in current days. Privacy and security concerns remain a crucial barrier to overcome but the marketing mix, with a good promotional strategy, for instance, may solve the customers' resistance. This future objective suggests the *dynamic position* of Firm A we have represented in Figure 10. The marketing strategy is moving more intensively toward the consumer side, with the aim of exploiting the IoT data to profile customers and reach them more directly, maybe with a digital marketing strategy and a greater customization of the offering (product and services).

While detecting the main obstacles firms are facing in the IoT implementation, Firm A suggests that the improvement of the technological structure (algorithm in particular) is not simple and requires specific expertise and skills. It was a long process, due to the novelty of the technology itself and the investment required. Moreover, the firm had to decide whether to develop an internal team or to outsource the technological development and data analysis. They have decided to develop internally the project and then to rely on external partners for the pure development phase. For instance, Firm A has the capability to develop internally the algorithm or the electronics project, but the subsequent development is demanded to an external partner.

Finally, at the beginning of Firm A dedicated section, we have anticipated that the business size is relatively small if compared with the other case studies in our empirical analysis. The difference can be seen in Table 3, looking at the column of *Size/Revenues.* This feature has been stressed by the interviewee as one of the reasons why Firm A is not implementing the IoT connectivity yet. Even if a more suitable comparison should be made with the competitors

working in the same industry, what our interviewee would like to stress in relation to the firm size is that "the problem is not the technology itself, but the *organizational structure*. You need to change the mindset, the culture, the structure and people involved in the project. You need the financial resources to implement the technology and solutions able to collect, store and analyze the data and turn insights into profitable actions. Today, our technology is ready but to put it into action efficiently is another thing" the manager says. This statement supports our idea that the financial investment required to turn a firm into digital solutions – IoT included – is not easy and the related process of *digital transformation* calls for a structural change in the firm's mindset and internal organization.

The analysis of Firm A mainly confirms all our assumptions, with the exception of the *customer experience* point. But we should consider that the connectivity will be added in the next future and, in line with its industry and main competitors, Firm A is working to develop a differentiating IoT solution to successfully sell the product and its new opportunities for customers and the motorbikes market. In addition, with the connected app in future projects, it would be possible to design an *experience* around the product and its usage, involving customers in the value creation process.

3.4.2.2 Firm B and domestic coffee machines

Firm B's core product is coffee roasting and distribution on a global base. Its strategy since 2015 is slightly different if compared with big competitors. Firm B has started an internal reorganization, in particular of its *governance* with the aim of increasing the business and performance as much as possible. The other competitors are more focused on mergers & acquisitions, while Firm B decided to remain *independent*, as stated by its CEO in an interview (De Ceglia, 2017). Italy is the second most important market, with 36% of total revenues realized and where Firm B is well-positioned respect to the total market share value. The USA is currently the strongest source of revenues, where the business for Firm B is consolidated since roughly thirty years. The firm decided to enlarge the business to a near market, the production of coffee machines which represent a strategic vehicle to enhance the core product sales, in line with a *razor-and-blade* business model. This model became famous in the '50s thanks to the Gillette case, and it consists of selling a product at a relatively low price (or at least for free) with the aim of increasing the sales of a complementary good, that is the consumables (Fleish *et al*., 2014; Teece, 2010). The new business activity of Firm B is interesting for our discussion because it is developing coffee machines with embedded sensors and connectivity for data collection, both for the business and consumer markets.

Thus, Firm B is a perfect hybrid case as we can observe from Figure 10. In this section, we introduce the *domestic coffee machines* earmarked for the consumer side.

Firm B is positioned relatively near to the end-user in the supply-chain, as there are only retailers with physical shops, or distributors and parent corporations before reaching individual customers, depending on the type of product sold. Considering the domestic coffee machines, thought for the consumer market, Firm B can be categorized as a B2C case. In fact, the data collected from this IoT product are stored and analyzed to reshape and improve marketing strategies directed to the individual customers. The IoT implementation on the domestic machines is relatively new, a solution at its initial stages of development and diffusion on a global base. Currently, the domestic machine is sold only on the USA market using the online channel. Because of the recent launch of this product (last year) and the few pieces already on the market, the data collected and analyzed are not so large. On the whole, Firm B gives us some important insights into our research.

As we have anticipated beforehand, the roasted coffee is the core business product for Firm B and any alternative strategy is developed to enhance its sales, as it is for the domestic coffee machines, in line with a *razor-and-blade* business model. In fact, the IoT connectivity, realized through Bluetooth technology and supported by a dedicated app, has been introduced on the domestic machines with the main goal of encouraging customers toward the re-purchase of Firm B's coffee. As explained by our interviewee - Firm B's Design Engineer - this need comes from some difficulties encountered by customers when purchasing online. In fact, placing the order online may represent a barrier for many reasons (generally you have to register on the website, fill in with your personal and financial details and so on). This channel is the first and most important one for the American market as the physical shops are not so spread and, however, Firm B's customers may not have coffee shops nearby. To overcome this hurdle, Firm B has decided to develop the smart coffee machines for the domestic market, where the connectivity allows to control the level of coffee consumption and stock left through the dedicated app. The last is a means to access directly the firm's online e-commerce platform. The consumer doesn't have to fill in a form since all the data are already stored via the app, thus, he/she has only to order the coffee. The purchase process is similar to a dash-button/one-click but more sophisticated. It is done in partnership with Amazon and permits to customers, not only to repurchase directly the coffee on the e-commerce platform but also to access to the website of Firm B, creating a strategic element for marketing and advertising. Additionally, the use of the app permits a *personalization* of the coffee consumption and this can create a *user experience* for customers. Once entered on

the app it is possible to create a personal profile and define specific coffee variables to make a personalized coffee cup/type. All the data are saved and can be used by our firm to infer information on individual clients, preferences and maybe geo- location, in addition to all the information on coffee consumption and purchase.

The IoT technology applied to the domestic coffee machines has impacted on their price variable for a roughly 15% that is not negligible while considering the general price positioning for these machines. That is why Firm B needs to develop a new *value proposition*, able to let customers understand the reasons behind the additional price they are paying for the domestic coffee machine, the services they can receive back and how they can gain from the IoT product. This is a current challenge, along with the need to find a suitable way to encourage domestic customers to download and use the app. Our interviewee underlined the fact that privacy and security concerns are tangible and, even if the IoT technology is a new and powerful means for improving the quality of life, customers may be reluctant in adopting the app. The hurdles arise when the app is the main vehicle to collect customer data. Customers and Firm B attribute a different value to the app and this unveils one hidden problem for firms: what is worthy for the organization may be not the same for clients. That is why the development of a new value proposition is a concern that Firm B mustn't overlook if it aims at being successful in this new domestic-IoT business. This is important also considering the financial and skill commitment along with an internal re-organization led by an IoT project as part of a *digital transformation process.*

Anyway, Firm B does not define the financial investment as a "problem". Again, it is important to weigh costs and benefits, define the aims for which a firm decides to invest in the IoT technology and which goals could be achieved effectively. A radical change in the internal organization is essential and the structure has to be strong to overcome all the possible threats and challenges. For what concerns the skill problem, they have decided to rely on a mixed team, composed by both internal and external professional figures. This is because the internal employees have a deeper knowledge regarding the organization and the requirements/aims for the data analysis. The technological side of the process and the analysis itself is developed with the help of external consultants, as they have a bigger experience in the field.

3.4.3 How IoT technology and data are changing the B2B marketing strategy

According to our research, the organizations categorized into the B2B setting apply a marketing relation model focused on the business side as they are mainly involved in business

interactions. In the IoT case, the data collected by B2B firms come from the end-users of the connected product but are used to shape the B2B marketing strategy relative to their direct clients, that is other organizations. Data analysis has a different aim and the insights are used to create a marketing plan with different implications if compared to a B2C one.

After a review of the literature on the field, in the previous chapter, we have maintained the idea that B2B firms investing in the Internet of Things use the data to provide better and new services, with the aim of strengthening their business relationships and create long-lasting collaborations. Personalized and value-added services can enhance the value perceived by business clients and, consequently, the value to capture from them. IoT implementation is not easy for B2B firms, in particular because it is hard to transmit the additional value to customers and as a consequence, the investment is riskier in terms of success. IoT projects for B2B products can find a resistance from business clients in the adoption, caused by the additional costs to support related to the purchase of a smart object, and the consequent organizational and cultural change required not only to the supplier but also to the buyer. Additionally, the mentioned additional costs impact also on the product marketed by industrial clients and this is another obstacle. All of these elements can represent a barrier and can discourage B2B firms from adding sensors and connectivity to their products sold to other firms. Anyway, along with the analysis of the two case studies, we will underline the potential benefits coming from the IoT investment and how it can change the marketing strategies of B2B firms.

3.4.3.1 Firm B and professional coffee machines

Going back to Firm B, we now analyze the *professional coffee machines* and the position of this business in the B2B setting. In that case, the IoT product is designed for the professional market and is sold to other organizations (bars, restaurants or hotels) in a classical BtoB context. Thus, the marketing relation model of Firm B is closer to the business side. Additionally, Firm B can be categorized as a B2B case because it is collecting data from the professional coffee machines with the main aim of shaping its marketing strategies for the direct business clients, which are generally distributors or parent corporations. Though, as we have stressed for the B2C case, also in the B2B one, the coffee sold through the coffee machines represents the core business product of Firm B and is directed mainly to individual customers. Thus, the professional coffee machines are a means to increase the sales of the consumable – coffee. This awareness allows us to explain, at the end of this paragraph, the

reasons behind the double movement of Firm B, that is its hybrid positioning in the middle of consumer and business marketing relation model (see Figure 10).

Going deeper in the B2B case, Firm B is developing professional coffee machines with embedded sensors and connectivity, able to collect data the firm is using to define new strategies and business models. The machines are provided with Wi-Fi connection and a dedicated user-interface where customers can detect problems or other issues related to the machines' use or functioning. Firm B is on the market with this innovative solution since 2014 and is present also in Italy. As suggested by our interviewee, the Design Engineer of Firm B, the main competitors are currently moving toward the IoT machines. But the competition in the coffee machine market is slightly different from the one in the coffee roasting. In fact, "the largest part of coffee machines' producers has not a strong interest in developing IoT solutions, remaining more tied to traditional projects" our interviewee says. It is important to stress again that Firm B is in the market for coffee machines mainly to push the consumption of coffee, thus, its aims and business perspectives are different from those of traditional machines' producers.

After these premises, we will focus on the main goals Firm B is pursuing with the IoT solution embedded in the coffee machines, considering its business relations. The connectivity allows for the collection of data which are analyzed in order to:

- undertake a qualitative control;
- monitoring the coffee consumption;
- profile the users;
- develop a predictive maintenance.

The aim is to guarantee a high level of service for business clients, as the coffee machines represent the core business for them, and an unpredicted breakdown represents losses. The future objective for the professional area is to use data to implement more digital and not services, for both the clients and the connected product. Firm B aims to strengthen the relationship and collaboration with business clients and this is considered a very important objective. With the IoT technology developed for the professional machines, business clients can rely on the real-time information transmitted by the devices and analyzed by Firm B, which can support the clients with dedicated services to solve any hurdle. In addition, customers can access a dedicated *user-interface* where is possible to find information about the machines, such as how they are used, potential faults, profile the users and the time-frame where machines are working more, make comparisons between the coffee revenues and the

number of coffee per hour produced, and so on. This service is highly appreciated in particular by parent corporations which may have several working machines in different areas and the interface may help the process of monitoring and control. What described till now confirms our hypothesis on the importance of data to enhance the customer engagement and relationship strategy in B2B markets, in particular through a service and digital service strategy.

Also in this case, the connectivity applied to the professional coffee machines has impacted on their price variable, here for a roughly 5%. Firm B has to renew the *value proposition* thought for business clients, in order to overcome their resistance in adopting a connected solution, which may come from the price positioning of traditional coffee machines, less innovative but leaders in the professional market. Firm B has to communicate effectively the additional value coming from the IoT solution, how the related services can benefit the clients and their strategy as well. This is a current challenge along with the internal re-organization and the financial and skill commitment explained beforehand, which impacted the firm in general terms when investing in the IoT technology.

As anticipated at the beginning of this section, the double movement of Firm B towards both the business and consumer markets (Figure 10) depends on its real core business: the sales of consumable – coffee. The value chain position of Firm B, relatively near to the final consumers and also involved in business interactions, represents its point of leverage/advantage. The real targeted market for the firm encompasses anyone who can consume and enjoy the quality of its coffee, thus, it is exploiting two different channels - both the business and consumer interactions - to reach the strategic aim of its marketing planning: providing high-quality coffee, increasing its sales and engaging new customers. Enhancing and strengthening the business relationships is a way to guarantee and enlarge as much as possible the purchase and consumption of roasted coffee. At the same time, Firm B is working directly on the consumer market with the domestic coffee machines, enhancing the customer engagement and satisfaction with an innovative product, which aim is again to push customers toward the re-purchase of coffee.

3.4.3.2 Firm C and the heating technology components

Firm C is an international company, based in the north of Italy, which is consolidated in the business of appliances (domestic side). In the last decades, since the 1960s, Firm C has invested in the creation of a *spinoff* dedicated to the development of industrial resistances or *heating technology components*. The firm has a dedicated business unit for the creation of this

heating technology (along with the electrical part, the firm provides the sensors and the overall IoT infrastructure). Firm C is categorized in the B2B setting because, in the specific case presented, the smart object is sold to other organizations – producers of appliances – and the data collected are used to improve the marketing strategies thought for business clients. In particular, Firm C is an Original Equipment Manufacturer (OEM) mainly involved in interactions and relationships with organizations part of the same value chain or in partnership with it. The firm is positioned in the upstream of the value chain and a lot of utilities are among Firm C and the final customer. But looking at Firm C from a *dynamic perspective*, it is trying to move toward the consumer side, deploying more direct relations with the end-users in the value chain (Figure 10). This is because the connectivity installed by Firm C can benefit also the individual customers of the heating system, as we will explain in the following.

In detail, the IoT product is composed by the resistances, with the sensors and connectivity, designed to be installed – as an integral part – on a heating element, such as a radiator for home, produced by another organization (the direct client of Firm C). This is the Business-to-Business interaction where the data, collected from the smart resistance, can help Firm C in the development of dedicated solutions and services for clients. The smart device is installed on a heating product thought for the consumer market, thus, the data collected and stored by Firm C are related to the final user. The data transmitted can be the base of specific information, such as how the customers use the connected product, which functionality is most used or which one is not appreciated, recurrent problems, the geo-localization of the connected devices and so on. Then, data analysis permits to Firm C to improve three strategic areas in particular:

1. New product development, shaping the next generation of heating technology elements to install on appliances/radiators;
2. The service and digital services developed for direct clients;
3. The post-Sales service;

The last point has been stressed by the interviewee as particularly important. In fact, the largest part of calls to the Service function (roughly 50% according to our interviewee) regards problems or malfunctions perceived by customers which are different from the real/true fault. The inefficiency of this process leads to a waste of resources and time, thus, the introduction of the IoT solution has optimized the post-sales process. In fact, the connectivity applied to the final product allows to send early alerts or to have a more accurate description of the problem and this is translated into savings and a better post-sale service.

Through the data analysis, Firm C aims also to strengthen the relationship with business clients and to let them understand the real added value of the connectivity applied to their product. From these premises, Firm C has developed a *new value proposition* for the direct clients (producers of appliances), which is based on the improvement of service provision and on adding new services/digital services. This can confirm our hypothesis two. B2B firms use the IoT technology as a means to enhance the relationship with their business clients, using the IoT data to define what services, including digital services, can increase the collaboration and customer satisfaction. Firm C has built the new value proposition on services such as: remote service, control of the warranty based on when the appliance is connected for the first time, root cause analysis, analysis of recurrent problems and malfunctions with a potential predictive maintenance, and so on. The product is surrounded and combined with a series of services which represent the real value to create and deliver. In the next future, Firm C sees another potential application of IoT data collection, that is basically the sale of the data to other *utilities.* They (utilities) can be interested in a market penetration or in gather information about potential clients in the industry or sector where the firm collecting data (in our case Firm C) is working.

The need for this change in the value proposition comes not only from the radical change in the component itself, brought by the connectivity, but also from a problem related to the clients' reaction. In fact, with the purchase of the IoT heating component, clients have to support both fixed and variable costs, at the face of unsure and unreliable revenues. The fixed costs are related to the connectivity and to the IoT infrastructure, fundamental for the development of IoT projects, while the variable costs come from a fee to pay based on the total number of connected products present in the market. At the end, these costs together will enhance the final price of the product – appliance. Thus, with the introduction of the smart component, both Firm C and its direct client have to re-think the value proposition for the respective customers in order to justify the additional price for the additional value delivered. The disadvantage is enlarged by the fact that there are no cases among the clients which can prove the benefits and returns coming from the IoT investment. The clients' resistance has to be overcome with the development of a persuasive value proposition, able to stress all the benefits and the fact that the initial investment required is a transitory phase which will be paid back in the long term.

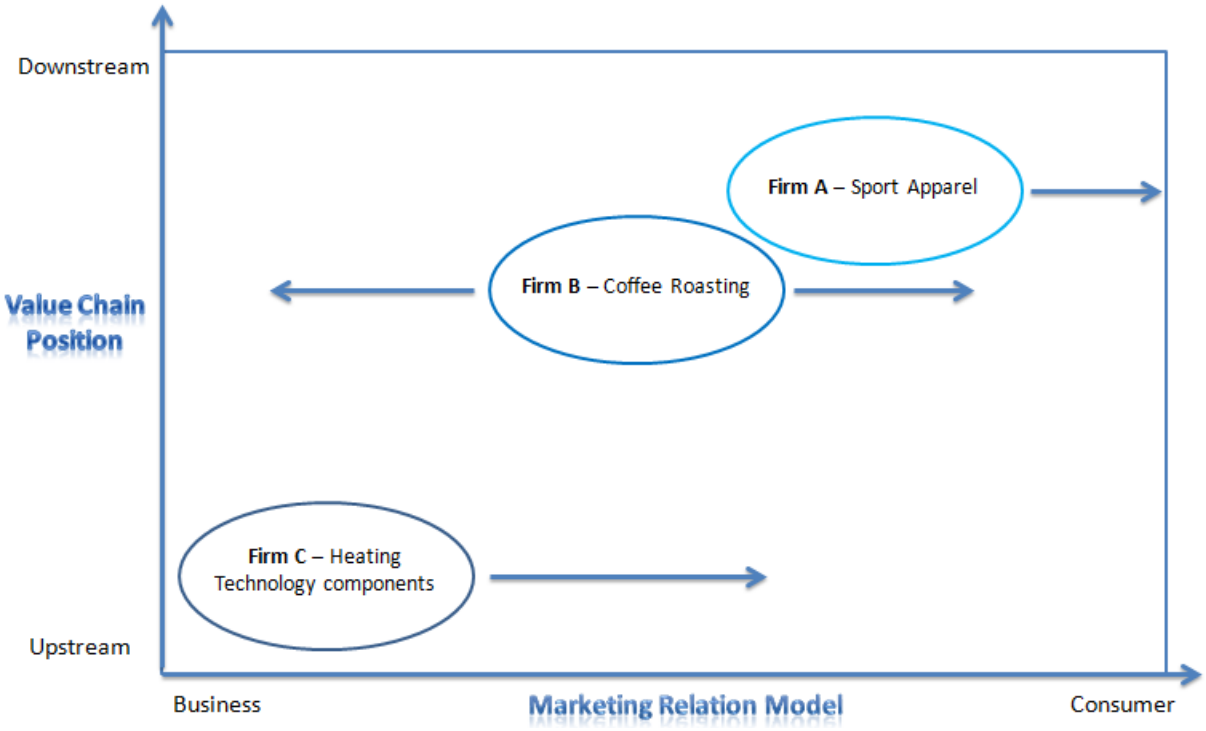
As we have stressed while introducing Firm C, its value chain position is completely on the upstream side (Figure 10). The firm is involved in the first stages of a long B2B2C value chain, but the final product, where the connected element is installed, can benefit also the

final user, improving the *usability* and *user experience*. This can be realized simply with a smart thermostat, whose display is touchable and easy to use. Additionally, the thermostat can be connected through the IoT infrastructure, where the heating technology element is connected as well. The recent revolution that is occurring in the *smart home* domain, with systems like Google Assistant or Amazon Echo, is even more enhancing the potentiality of IoT projects. Each smart device in the home can be connected through a dedicated platform/infrastructure and can communicate with each other and with the residents. For instance, it would be possible to exploit the smartphone GPS system and transmit to the IoT infrastructure information on the user location. When the user is closer to home, the signal is sent to the thermostat and it switches on the heating system in the home or in specific rooms. The IoT infrastructure permits also a remote control of all connected elements, changing the home heating schedule along with changes in the wheatear. For the consumer market, the additional value of Firm C's product with the IoT is based on a consumption concept: the integrated system allows a conscious consumption from both a saving and a sustainability viewpoint. This is what we referred to beforehand when defining the *dynamic* marketing relation model applied by Firm C: the benefits brought by the smart heating component are perceived also by the end-users in the value chain, as it enhances the *usability* and *user experience* of the appliance where it is integrated. With a less direct path, Firm C is able to reach also the consumer market and to strengthen this possibility, the firm is working on a dedicated app for individual customers. The app, provided directly by Firm C, allows customers to interact with the smart device and control it remotely. That is why, when giving the definitions of B2B and B2C markets, we have stressed the more suitable idea of a continuum line, where hybrid solutions are in the middle. In Figure 10, we have depicted the dynamic situation and the possible movement of Firm C toward a consumer marketing relation model.

As we have stressed for the two case studies in a B2C context, also in a B2B one finding capable skills to manage the IoT project is not easy. "It means to build up a part of the organization that does not exist before" as said by our interviewee. The choice of Firm C has been to create some partnerships and to outsource the developing and analytical part of the project. In addition, they have created an internal team in the IT department, with the needed experience for managing and solving problems with the IoT solution. As we have seen for Firm B, we have a mixed solution where both internal and external skills are involved to develop the IoT landscape and let it works well. Also Firm C has faced the issue related to the IoT financial investment, which was evaluated carefully with all the opportunities and threats.

Again, before to dive financially into an IoT project, the firm should be able to face an organizational change. This is the basic premise for a successful adoption of the Internet of Things and, in a B2B case, it could affect also the business clients, implying an evolutionary path/process that affects both the supplier and its buyer, as we have found in Firm C case.

Figure 10: BtoB and BtoC continuum line: criteria for the case studies classification and dynamic representation (source: our chart)



Conclusions

The aim of this work is to study and understand the main impacts of the technological disruption of firms' marketing strategies brought by digital technologies, in particular looking at the Internet of Things phenomenon and its great opportunities and challenges. In order to properly analyze such a complex topic, we have chosen to categorize our empirical cases using the acknowledged distinction between BtoB and BtoC contexts. Following both the traditional theoretical dichotomy presented in the extant literature (see chapter 2) and the evidence from real business cases, we have designed an original explicative model basing on two criteria: 1. the firm position in the value chain and 2. its marketing relation model.

The model allows us to categorize our four qualitative case studies into the traditional B2B vs. B2C stereotypes, looking firstly to a *static* definition (relating to the traditional dichotomy) and then introducing a *dynamic* analysis of the solutions adopted. In fact, looking at real business examples involved in long and complex supply chains, it is more suitable to define a *continuum line* where pure B2B and B2C models are at the extremes of a conceptual space where a pool of *hybrid* cases may exist.

In chapter 3, we have presented six propositions, capitalizing on a literature review related to marketing, digital transformation and IoT research fields. The proposed hypotheses try to reflect direct and indirect changes brought by the development of IoT projects in both BtoB and BtoC firms. The direct changes are related to two marketing areas in particular which, in our opinion, may benefit the most from an IoT implementation: the *customer engagement/relationship* and the *servitization and digital servitization*. The indirect consequences are referred to the organizational and cultural changes which are considered inevitable for a successful adoption of IoT solutions. From the evidence of the case-study analysis, we provide the conclusions and define if these propositions are confirmed or not. The conclusions are summarized in Table 4, where we present the main differences found in BtoB and BtoC firms investing in the Internet of Things, with respect to our hypotheses.

Conclusions for the B2C market

For the B2C case studies, we can conclude that all the propositions have been confirmed. Our findings underline that the Internet of Things gives the opportunity to consumer firms to improve the marketing strategy and enhance the customer engagement and relationship. IoT data are analyzed mainly with the aim of *increasing sales and improving product development* (Hp.1). *How* to enhance the offering depends on the client needs and type of offering. For

instance, B2C firms can personalize or customize the product, solve some recurrent problems in the product usage, differentiate their offering from the competition thanks to the IoT technology. Not only the product can be optimized, but the overall marketing mix strategy. In fact, through the data analysis, firms can find insights that suggest a better price positioning or a new promotional strategy, related to the connected product. Firm A, for instance, foresees the possibility to deploy bikers' personal and individual data to create a personalized communication or digital marketing strategy to involve more the users in the value creation process and lead them to purchase other Firm A' products.

Thanks to data analysis, B2C firms are surrounding the product with new services, including digital services, where the app is one of the most important means developed and exploited by firms, as we have seen in both B2C case studies. The app is the main vehicle used by consumer firms to reach and involve directly the final users, allowing an interaction with the product and/or the firm. Customers have access to several services provided through the app and, additionally, they transmit data related to both the IoT product and their personal behavior and preferences to the firm. But, in our opinion, these services do not represent the core of the offering as they are used to engage customers and create a potential *experience*. What remains central is the product and how it works. This introduces the *relevant difference* between BtoC and BtoB firms investing in IoT solutions, stressed in the first line of Table 4 – "Main goal pursued with IoT investment". On one hand, consumer firms are concerned in deploying IoT data mainly for increasing sales and improving the product development, thus enhancing the customer engagement strategy. The services provided surround the product and represent a means for reaching this objective. On the other side, B2B firms invest more on a servitization strategy as a strong value-added, fundamental to strengthen the customer relationship.

Anyway, for BtoC firms, the additional value of the IoT product is not easy to communicate and one main concern is related to the development of a *new value proposition* (Hp.3). IoT technology is a significant investment and requires not only innovativeness but also financial capability and professional figures able to handle it (Hp.6). Both Firm A and B have decided to invest in external partnerships with dedicated skills and expertise in the field of technology and data analysis. This means to create new business capabilities and commits or continue into a process of *digital transformation*. Our two B2C firms have initiated this transition roughly 15 years ago, and a consequent change in the business culture and internal organization is considered fundamental to succeed in the development of IoT solutions (Hp.5). Finally, we have found that privacy and security concerns pose significant challenges

to our firms and, in particular, they have stressed the potential resistance of customers in adopting the app, specific for the IoT product and main vehicle to collect the data (Hp.4). Anyway, Firm A in particular, believes that the perceived resistance may be easily overcome and our opinion lines up with that of Firm A. Probably, in the next future the share of data and related privacy issues will be no more perceived as a problem by clients: once they will understand how firms can use those data to improve the product and service in favor of their satisfaction, customers will be willing to share their data. This challenge can be solved, for instance, with a dedicated communication and promotional campaign, to tempt customers and reward them when using the app.

Table 4: Conclusions: comparison between BtoB and BtoC firms (source: our chart)

Differences	**BtoB**	**BtoC**
Main goal pursued with IoT investment	Enhancing and strengthening the customer relationship and collaboration	Increasing sales and improving product development – enhancing the customer engagement
Security and Privacy concern	Less relevant	More relevant
Customer resistance	Business clients may be tied to traditional (non-IoT) solutions or be reluctant for the increasing costs at the face of unreliable returns of IoT	Individual customers may not be interested in the download of the dedicated app

Conclusions for the B2B market

The two case studies in a B2B context allow us to confirm our main hypothesis, too. Business firms which invest in the IoT technology can collect and analyze data coming from the connected thing and, based on the insights, improve and/or develop a series of services with the aim of strengthening their business relationships (Hp.2). Here the focus is no more on the simple product itself, as it is a means to collect information and understand the needs and requirements of business clients. This way, B2B firms can improve the marketing strategy, providing services (also digitalized services) which increase the satisfaction and collaboration with clients. Consequently, based on our evidence, it is possible to confirm that B2B companies are moving toward Servitization, including a Digital Servitization, as part of their strategic plan, to improve the customer engagement and relationship. For instance, Firm C has built up a completely new business model and value proposition for its direct clients, based on a series of services thought to improve the collaboration and business relationship with them.

In particular, the development of new services is suggested by the data analysis and is based on the insights coming from both the product and the clients.

However, one main problem is in communicating the additional value that industrial manufacturers are creating using the IoT data. The development of a new value proposition is not easy but fundamental task if B2B firms want to gain from the IoT investment (Hp.3). Additionally, as we have stressed for B2C firms, also B2B ones have to deal with a change of organizational mindsets and structures before diving into IoT projects (Hp.5). The *Big Data or Digital culture* leads to a reorganization of internal structure, inter-functional relations and requires creating a new business unit able to manage the new technology and the stream of data. Our B2B firms are exploiting external partnerships, outsourcing the parts related to the technical development and the analytics. Both Firm B and C have developed internal teams which collaborate with external consultants/organizations (Hp.6).

The greatest obstacle found in both B2B cases is represented by the impact that the implementation of IoT solutions have on the buyers / direct clients of these firms. Firstly, purchasing a connected product requires additional costs to support by business clients, generally both fixed and variable costs, in face of unsure and unreliable revenues. The fixed costs are related to the connectivity and to the IoT infrastructure, fundamental for the development of IoT projects, while the variable costs come from a fee to pay based on the total number of connected products present in the market. This is a typical pricing model implemented for IoT products. Consequently, these increasing costs impact on the product price set by business clients.

Secondly, when introducing the IoT technology, the buyers have to adapt their internal organization and change as well the business culture, developing a proactive behavior through innovation and technological deployment. The introduction of IoT technology leads business clients to re-think the value proposition for their clients, which has to communicate the additional value delivered by the Internet of Things. This way, business clients can justify the additional price respect to non-connected solutions present in the market. This implies an evolutionary path/process that affects both the supplier and its buyer, as we have seen in both Firm C and Firm B (professional coffee machines). The resistance in adopting the IoT device found in business clients can be compared to the individual customers' resistance in adopting the dedicated app, as we can observe in Table 4 (last line). Finally, the security and privacy concern has not been stressed in any of our B2B cases, probably because it is not reputed to

be critical in this market, as the direct clients are firms which are more structured to face these problems if compared to individual customers (Hp.4).

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Sitography

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Appendix: Case-study questionnaire

UNIVERSITÀ DEGLI STUDI DI PADOVA

Digital Technologies and Marketing:
The impact of IOT and Data Analysis technologies on marketing strategies

Which are the organizational challenges your firm is currently facing? (1 = irrelevant 6 = very important)

Organizational challenges	**1**	**2**	**3**	**4**	**5**	**6**
Turnaround after a crisis period						
Augment the market share						
Improve the customer satisfaction						
Improve the internal organization						
Improve the operational technology						
Develop new technologies with the aim of improving the product/offering						
Construct a distribution network						
Search for external partners for outsourcing a part of my activity						
Change the business model						
other_____						

Which is your competitive position?

	Sel.
Market leader	☐
Competitive advantage	☐
Small competitive advantage	☐
Small competitive disadvantage	☐
Competitive disadvantage	☐

Which are your company's points of strength (1 = irrelevant, 6 = very important)

	1	**2**	**3**	**4**	**5**	**6**
Cost – price						
Quality – functionality						
Variety						
Personalization						
Rapid production and delivery						
Deployment of digital technologies						
Innovation						
Design – *customer experience*						
Other _____						

What is the product / line of products you consider most suitable to evolve with digital technologies like IOT and Data Analysis (this will be the focus of the following part of the questionnaire)?

_____

How would you define the impact of IOT and Data technologies on the product / line:

- ☐ Disrupting
- ☐ Modifying
- ☐ Enhancing

- No effects
- Other (specify) _____

Which services do you provide for your **direct** customers (distributors) related to the product? (please note: some options may be irrelevant or not consistent with your business)

Service	*YES, Internally*	*YES, Outsourcing*	*No*
Technical support with call centre			
On line documents			
Inspection and maintenance			
Sale of spare parts			
Financial services and consultancy			
Retrofitting of machines/products			
Costs-benefits analysis			
Sales of pre-owned products			
Consultancy and marketing support			
Consultancy and R&D support			
Other (please, specify _____)			

Which services do you provide for your **final** customer related to the product?

Service	*YES, Internally*	*YES, Outsourcing*	*No*
Product installation			
Training to product usage			
Technical support with call centre			
On line documents			
Inspection and maintenance			
Product warranty			
Sale of spare parts			
Modernization, *revamping, retrofitting* of products			
Product customization and personalization			
Trial period			
Sales of pre-owned products			
Other (please, specify _____)			

Are you collecting the data coming from the product's IOT devices?

- Yes
- No, but we will do so in the next future
- No

If yes:

- Are you providing a remote, cloud based, connectivity via a smartphone app to your product? Y/N _____
- For how long? ____ years
- And for what aims (multiple selection):
  - Improve current products
  - Develop new products
  - Add or improve services connected to the product
  - Add or improve services connected to the direct and/or final clients

- ☐ Enhance the value of the product
- ☐ Reduce the production costs
- ☐ Identify and/or forecast the main product's problems
- ☐ Develop forecasts and/or find interesting patterns
- ☐ Improve the marketing strategies
- ☐ Other (please, specify)_____

What is the frequency of IOT data analysis:

- ☐ We don't do data analysis
- ☐ Una Tantum
- ☐ Weekly
- ☐ Daily

Who is in charge of analysing the IOT data?

- ☐ A dedicated internal team
- ☐ External consultants / partners
- ☐ A company belonging to the group
- ☐ Other (please, specify)_____

How are the IOT data analyzed?

- ☐ With a summary of data in reports and documents
- ☐ With *data mining* procedures
- ☐ With *root cause analysis*
- ☐ We develop forecasts and optimization models
- ☐ Other (please, specify) _____

Which are the functional areas that benefit most from IOT data analysis?

- ☐ No data are gathered
- ☐ Operations
- ☐ Marketing
- ☐ Sales
- ☐ pre-sales service
- ☐ post-sales service
- ☐ Other (please, specify) _____

Which are the impacts of IOT data analysis on the relationship with your **direct** clients?

- ☐ No impacts
- ☐ We have developed new services for them
- ☐ We have personalized and/or improved the existing services
- ☐ We have developed new digital services (in addition to traditional ones)
- ☐ We have strengthen the relationship with them
- ☐ Other (please, specify)_____

How do IOT data impact on the services provided to your **direct** clients?

- ☐ No impacts on services
- ☐ We provide more services
- ☐ The costs of services provision are lower
- ☐ The revenues of services are higher
- ☐ Other (please, specify) _____

Which are the impacts of IOT data analysis on the relationship with the **final** customer?

- ☐ We have created more personalized products and/or new variants

- ☐ We have improved the product performance
- ☐ We have created new offerings
- ☐ We have enlarged the customer-base (*customer engagement*)
- ☐ We have improved the customer loyalty
- ☐ Other (please, specify) _____

How do IOT and Data technologies impact on your business model?

- ☐ No changes occurred
- ☐ We do the same things but more efficiently
- ☐ We have added a series of services but the product is the same
- ☐ The business model is profoundly different after the IOT adoption
- ☐ Other (please, specify) _____

Where do you invest the **largest part** of the R&D budget? (only one answer please)

Objective	*Sel.*
We do not have a R&D budget	☐
In the improvement of internal productive processes	☐
In product development	☐
In service development	☐
Other (please, specify)_____	☐

Which ICT applications is your business employing (currently or within the next 3 years)?

ICTapplications	Currently employed	In 2020 or later
ERP (Enterprise Resource Planning)		
Groupware per workflow management		
Decision Support System		
Datawarehousing and Datamining		
E-learning		
Intranet		
Supply Chain Management for procurement management		
E-commerce		
Customer Relationship Management		
Web site and/or app		
Other (please, specify)_____		

With respect to your business, do you think the following technologies are more important today or will be in the next future (in 3 years)?

	Today	In 2020 or later
Intelligent digital assistant (Siri, Google Now, Vivi)		
Cloud computing		
3d printing (additive manufacturing)		
Nanotechnologies		
IOT, Internet of Things (including: sensors wireless, RFID)		
Industrial Internet of Things		
Augmented Realty (additional contents: video, audio, 3D objects; eg: Epson Moverio).		
Virtual Reality		

Social manufacturing		
Internet-data marketing (social e mobile marketing)		

In your opinion, which obstacles have prevented or delayed the employment of the above listed technologies?

Agree

Disagree

	1	**2**	**3**	**4**	**5**	**6**
These technologies are not strategic for my business						
Financial hurdles						
Obstacles related to skills: lack of professionals able to manage with these technologies						
Obstacles related to skills: lack of external consultants able to help our business						
Time and/or organizational obstacles						
Other _____						

How do you think to fill the gap (if it exists) between the current skills and those necessary to handle with the above listed technologies?

	Sel.
We do not want to fill the gap	☐
Investing in internal resources	☐
With the help of external consultants	☐
Outsourcing the organizational part related to these technologies	☐
Building or being part of a firms' network	☐
Other _____	☐

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