Digital technology, value creation and industry structure. Evidence from the Italian manufacturing industry

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ABSTRACT

This paper presents preliminary evidence on the role and the influence of the digital technology in the process of value creation and capture within firms and across sectors. Specifically, the paper studies if and to what extent the data-generation process affects the SMEs competitive dynamic and the modification of their business models. A survey on 425 SMEs shows that despite the high share of adopters, both the data-generation processes and the change of the business model are still under-developed among SMEs. From a policy perspective, this evidence calls for actions targeted to increase the stock of digital skills available to SMEs, aimed at supporting the entrepreneurial abilities to spot and exploit business opportunities along the value chain generated by the digital technology.

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1. Introduction

Are companies able to see whether the value is generated/created and where is migrating? An example of value migration is the case of the personal computer industry, in particular the case of IBM and its business relationships with Intel and Microsoft. According to Helper (2017), an effort to improve time to market led IBM to decide to bet on modularity, hence abandon the control of the operating system and the microprocessor. In the meanwhile, Microsoft and Intel had acquired control over the operating system and the microprocessor and they were more motivated to make them compatible with all of the other devices in the value chain. This happened while IBM was focus on defending itself from other competitors such as Apple and Compaq. As a consequence, IBM paid less attention to the competition coming from other segments, in particular the competition on standards that was won by Intel and Microsoft. The result of increased modularity and the emergence of an open architecture was the waning of the dominance of Apple, Compaq et al, in the industry architecture, with suppliers such as Intel and Microsoft gaining significantly more importance. The paper aims at studying if and to what extent the digital technology is affecting the process of value generation and migration in manufacturing sectors.

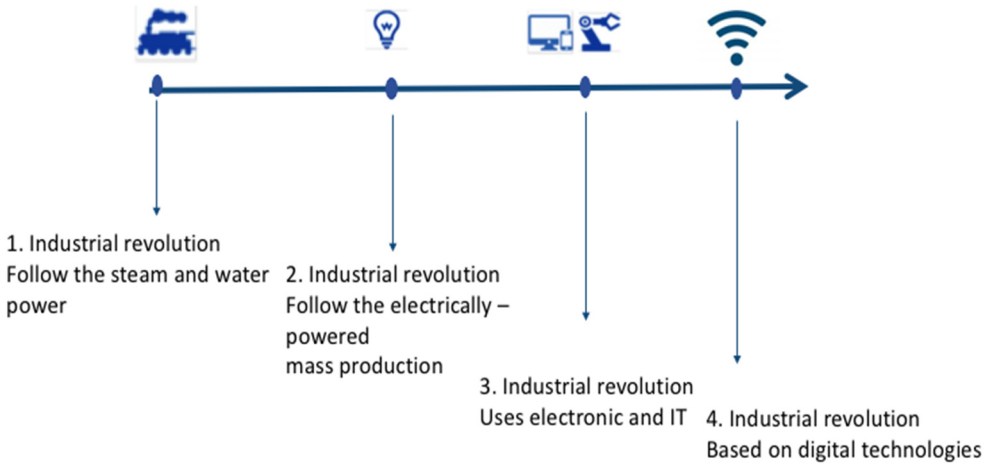
2. Industry 4.0

According to Deloitte' report (2018) each revolution is characterized by its ability to transform economies, jobs and even society itself through the introduction of new technologies and processes. Industry 4.0 means that three revolutions have already changed the system. The first one, that took place at the end of the eighteenth century, was characterized by the power of water and steam, while the second was driven by the introduction of electrical power and production lines. These elements enabled the mass production of goods based on the division of labor. Then, the third revolution, which started during the mid-1970s and has continued until the present day, is characterized by the use of electronics and IT to drive automation of processes. The fourth industrial revolution, called "evolution" by a number of experts, is happening now, and it is characterized by automation.

As regards the manufacturing sector, in Italy after the implementation of the National Plan, the first tangible effect was shown by an increasing trend in domestic orders. In particular, UCIMA gathered data for the first quarter of 2017 and there is an increase of 22.2%, while in the second quarter it rose to 28.5%, confirming the willingness to purchase new machinery and technologies as a result of the implemented financial tools.

The idea is to create an industrial production characterized by the strong individualization of products under the conditions of highly flexible production, extensive integration of customers and business partners in business and value-added processes and (to connect) the linking production and high-quality services. These digital technologies are carving their way into everything from inbound logistics to production, marketing, outbound logistics and services. Thanks to the smart manufacturing and

logistics systems it is possible to generate the optimal strategy to respond to the real-time demand as well as to create new business models.
Smart manufacturing is a term used by several agencies, such as the National Institute of Standards and technologies in the United States. According to Thoben (2016), Smart manufacturing can be defined as the usage of the ICT (information and communication technologies) and advanced data analytics to ameliorate the manufacturing operations at all levels of the supply network, on the shop floor, factory or supply chain.
What characterizes the smart manufacturing is the interaction between technologies and workers, now able to be connected with each other into the company. The human's abilities have to be enhanced by smartly designing a customized solution for a specific area and not just be replaced by technologies such as the artificial intelligence. The main purposes of smart manufacturing are plantwide optimization, sustainable production and agile supply chain. Through digital technologies, it is now possible to control everything inside the company.



Products are uniquely identifiable and may be located at all times in addition to knowing their own history, current status and alternative routes to achieve their target state. Furthermore, smart products are able to support the manufacturing process. It is now up to the sheet of metal to tell the machine how it has to be handled. There are also autonomous, distributed machines, robots and warehousing systems that control and configure themselves, in accordance with the needs of the current situation, and are able to negotiate with each other to establish at any moment which one has spare capacity.
By means of the technologies of Industry 4.0 it is possible, as said before, to reduce resources consumption and waste. For instance, in logistics, they allow a reduction of the transportation processes and unnecessary material flows. In addition, thanks to the use of data in the supply chain, wrong deliveries, too long waiting time and damaged products can be reduced.

Furthermore, Smart factories are vertically linked to the operational processes of individual factories and companies while being horizontally linked to value networks that stretch across the entire globe, incorporating everything from the moment of order to the delivery.

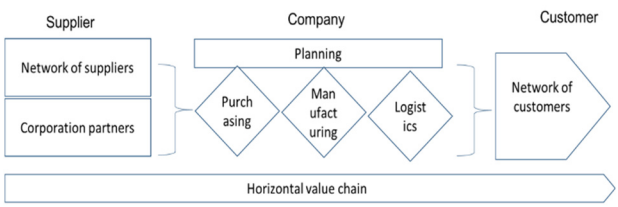
3. Value creation processes and the digital technology

According to Kagermann (2014), as a result of the transformations produced by the digitalization, today's value chain and business model will face increasing pressure. Nevertheless, as Parviainen et al. (2017) stated, digitalization can also bring new business opportunities, as well as change the role of operators in a value chain and existing business. For example, digitalization can remove traditional intermediates in the supply chain and create new intermediates; Amazon is a good example to explain this transformation. This, for instance, may be due to activities such as direct access to consumers and increased use of mobile devices.

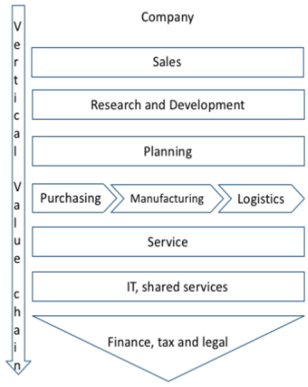
Brandenburger and Stuart (1996) use a cooperative game theory framework to understand how distribution of value along the value chain is determined by bargaining among the players, with firms trying to play one supplier off against another and customers doing the same to firms. Firms play an important role in determining the industry architecture shaping, as the personal computer industry example illustrates, especially in the case of IBM, Intel and Microsoft. Firms are not mere spectators in the process, passively observing the interplay of technological change, final industry arrangement, and value capture. (Jacobides 2005, Ferraro and Gurses 2009). In the strategic management, firms can adopt strategies that allow them to become the 'bottleneck' in the flow of added value along the production chain.

According to Teece (1986), firms can take action to gain control over the complementary assets of the industry, and to avoid being dependent on other actors by enhancing the fungibility/ mobility of the components that are required in their production process. (Jacobides, Knudsen and Augier 2006). Furthermore, According to Helper (2017) these strategies want to adapt the industry architecture to the firm's current capabilities. An alternative way is to supervise and adapt the industry architecture to the firm's capabilities in an active way. In so doing, companies are able to occupy a better position in the value chain. This can be a hard passage because routines, that are at the base of a company's ability, are often elaborated and developed over a long run.

An interesting insight about the Industry 4.0 requiring comprehensive digitalization of the horizontal and vertical value chain has been studied by Pwc (2014). Many companies identified a clear added value in the digitization of the value chain. Digitization is finding its way into horizontal as well as vertical value chains to an equal extent. As it is possible to imagine, both digitizations occur through different methods and concern different operations and activities.



The digitization of the horizontal value chain integrates and optimizes the flow of information and products from the customer through their own company to the supplier and back. This process involves the integration and proactive controlling of all company internal departments, such as purchasing, manufacturing, logistics and planning. But it also includes all the eternal value chain partners that are needed to satisfy customer requirements and fulfil requested services.



On the contrary, vertical digitization is connected with securing an important flow of information and data, as shown in the chart above, from sales through product development to manufacturing and logistics. Quality and flexibility can be increased, while costs can be reduced by means of optimal connection of manufacturing systems, in addition to the prevention of system failures and better analytical abilities.

4. Value migration

In the opinion of Jacobides, Knudnes and Augier (2006) the concept of value migration refers to the changes in value appropriability along the value chain, over time, which can occur due to a change in the industry structure.

According to a report conducted by Pwc (2014), digitized products and services generate approximately 110 billion euros of additional revenues per year for the European industry. This means that the importance or the share of software and digital elements in the total added value of a product will increase to a great extent. Furthermore, the digitization of the product and service portfolio serves the purpose of securing market share and keeping pace with international competition.

In addition, companies are associating Industry 4.0 applications with growth targets. As regards to value migration linked to the digitization transformations, there is an interesting and more specific finding about the manufacturing sector from Helper et al. (2017).

In Helper et al., integrators that are placed between upstream suppliers and downstream customers are starting to become responsible for a significant portion of the manufacturing process. Specifically, those parts of the process that become automated and optimized via data analytics.

Hence, there is the possibility that any value that depends on and is produced by the application of automation and analytics in the manufacturing operations could be shifted in the integrator's company. This likelihood is probably increasing to the extent that customers are willing to outsource to integrators the knowledge required to set up and maintain a "smart manufacturing" unit. The idea is that where customers are not aware of their operations, and thus do not know how to optimize them, integrators can do it for them. By doing so, not only does the customer pays more, the integrator is also able to leverage the knowledge spillovers accrued from accumulating data and experience to other settings.

Furthermore, according to Helper et al. (2017), where Industry 4.0 is becoming a tangible reality, there are players who are haggling over data, that are the main source of value migration. In the case of IBM, a key part of the case was played by the shift in who controlled the customer experience, such in the case of the Industry 4.0 manufacturing where the shift of value seems to go to who controlled the data. Not only did Microsoft and Intel succeeded in asserting their brands over the OEMs, but they also managed to convince consumers that they were able to do this because there was little resistance from the OEMs.

On the contrary, in the automobile industry, where a shift of value did not happen, carmakers vigorously fought suppliers' effort to label their parts, let alone promote them.

For carmakers, control over the entire automobile is a strategic imperative and they have consciously and successfully resisted any attempt to erode it. [1] The blunder of IBM was the decision to open up and outsource to Microsoft and Intel as it developed the PC. IBM was focusing on where value was, not on where it could migrate to. IBM also missed the migration of decision rights in large organizations from the IT department to the CFO, allowing the creation of a multibillion-dollar enterprise software segment that SAP came to dominate. On the other hand, in the auto industry value did not migrate, even when carmakers chose to outsource certain parts of the value chain. But it is important to say that in the auto industry the final customer remained unchanged, as did customers' needs.

According to Harvard's scholars, Jacobides and MacDuffie, when a sector has high growth potential, the mindset of participants changes. Furthermore, growth potential makes firms accept changes in the industry architecture that may adversely affect their replaceability and ultimately change who acts as a quality guarantor.

Then there will be different consequences and strategies if the high-growth regards a relatively small industry or a large market. After that, if there is a small industry, incumbents will be less inclined to fight to preserve dominance when the absolute profits are limited. Whereas, in the other case, growth presents an interesting dilemma for incumbents since a smaller share of a fast-growing pie may well be worth a lot more than a stable or increasing share of a slower-growing one. In these situations, companies need to evaluate the relative merits of encouraging growth in their segments or keeping the segment captative.

As stated by Jacobides and MacDuffie, when the needs of the customer and the products and services that can address them shift quickly, incumbents face the most difficult

[1] HBR- How to drive value your way Michael G.Jacobides, John Paul MacDuffie (2013)

strategic challenge. For starters, they must be able to recognize that the end customer has changed or is changing. Then, they must be able to change their business model accordingly. Furthermore, in the opinion of Jacobides and MacDuffie, the success in an industry is driven less by the creation of a "competitive advantage" than by a firm's ability to move value to its parts of the value chain. To do that, companies must work to make themselves less replaceable so as to establish themselves as curators of quality in the eyes of their customers.

5. Business model and digital innovation

According to Amit and Zott (2012) business model innovation matters to managers, entrepreneurs and academic research for several reasons. Firstly, it represents an often-underutilized source of future value. Secondly, competitors could have more difficulties in imitating or replicating an entire novel activity system than a single novel product or process, since innovation at the level of business model can sometimes translate into a sustainable performance advantage. Lastly, because business model innovation can be such a potentially powerful competitive tool, managers must be attuned to the possibility of competitors' efforts in this area.

The business model is defined by Liu (2012) as a description of a company's intention to create and capture value by linking new technological environment to business strategies. The business model determines the way the company "does business" with its customers, partners and vendors.[2]

The digitization process affects many aspects of the company's organization. Part of this transformation are products, services, but also strategies and business models. Moreover, according to Rothmann et al. (2014), the digitalization can be considered either as a business model or a reshaping of the current business model that takes into account digital capabilities.

As stated in the paper written by Henriette et al. (2015), along with the technological shift, the convergence of social media and mobile technologies is changing the way business is conducted. Opportunities from new capabilities, such as the dematerialization, are a door opener to an extended market and result in an adjustment of business focus.

Moreover, in their opinion the digitalization is often presented as an unavoidable evolution as market imperatives present a high risk of not carrying out the technological shift. Furthermore, according to Henriette et al.(2015), a digital transformation project involves implementing digital capabilities to support business model transformations impacting entire organizations, especially operational processes, resources, internal and external users.

As stated by Amit and Zott (2012), even under conditions of resource scarcity, organizations do not need to renounce innovation as a way of enhancing their performance prospects.

Rather, managers should consider the opportunities offered by business model innovation to complement, if not replace, innovation in products or processes.

[2] Amit, R and Zott, C (2012) Creating value through business model innovation. Mit Sloan Management review.

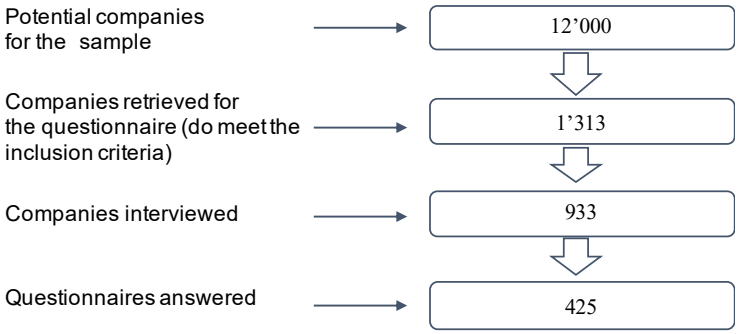
Furthermore, business model innovation can allow managers to resolve the apparent trade-off between innovation costs and benefits by addressing how they do business, for example, by involving partners in new value-creating activity systems.
According to Amit and Zott (2012), an innovative business model can either create a new market or allow company to create and exploit new opportunities in existing markets.
One example is Dell, that implemented a customer-driven, build-to order business model that replaced the traditional build-to-stock model of selling computers through retail stores.
In addition, business model innovation can occur in a number of ways. The first one concerns the new activity system "content", in which case novel activities such forward or backward integration are added. Secondly, there is the new activity system "structure", that is possible through the link of activity in novel ways. The last one is the new activity system "governance", that happens through the changes of one or more parties that perform any of the activities. Content, structure and governance are the three design elements that characterize a company's business model[3].

6. The empirical analysis

The survey focuses on the Marche region, because it possesses the suitable features to be studied. The presence of the industries in the region is significant, the major role is played by the SMEs and these are essential for the regional economy.
In order to identify the sample of firms to be included in the survey, information about companies was taken from the Amadeus dataset, considering all the enterprises in the Region. The universe of potential companies included more than 12'000 firms.
To define the initial sample size for the survey firstly were cut off all the companies with a turnover smaller than one million euro.
Then all the irrelevant actors were excluded like companies no more in business (defaulted companies or companies undergoing major restructuring, liquidation, or being target of acquisition) or operating on some fields such as residential, or care activities, but also accounting, bookkeeping and auditing activities; tax consultancy; construction of residential and non-residential buildings; support activities for crop production; sewerage and finally were keep out from the survey those companies with unknown addresses and contact numbers.
In conclusion, after further selection at the end 1'313 companies were available. Another filter was used for the financial data from the Amadeus dataset.
And, this, the sample was composed by 933 companies, all of which have been interview.
Evidences were drowned, following a series of interviews conducted on the phone during the period May - June 2018, and, in total, 425 answered questionnaires have been collected. The response ratio is 45% and it is significantly high. (Fig. below)
Questionnaire-based interviews had been conducted through short, individual phone calls to companies. Some entrepreneurs declined the participation to the survey. The most difficult part was the interview with the biggest enterprises, because they were reluctant to answer.

[3] Amit and Zott, (2001) Value Creation. Strategic Management Journal

To comply with a consistent allocation, for the final elaboration, only 425 completed questionnaires have been considered. Some of the indicators that have been taken into account are the following: sales, the profit margin, the roce and the number of employees of each company in the last three years.
Moreover, analysis of the sample and survey has been done with the goal to better understand the trend of the Industry 4.0 in the Marche region and its users that have been called “adopters”.



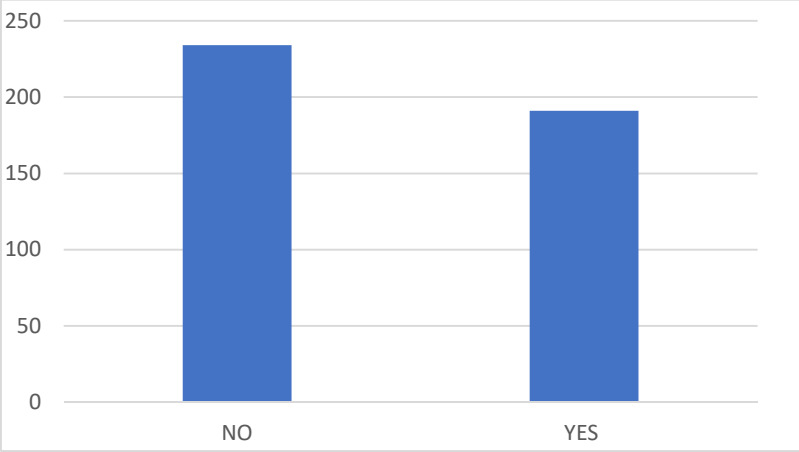
6.1 Methodology

To conduct the questionnaire to the company was asked the year of foundation and the first year of data production, then the IT manager, the CFO or the leader were invited to answer at the survey. The questions were organized in five sections; furthermore, a final question, about the leader of the company, was added. The purpose was to see if there are some differences in the adaptation of the digital technologies wheatear the company is managed by its founder, the second-generation heir or by an external manager. In the first section, were examined the adopters, if the interviewed was aware of the digital transformation, after that was asked if there were some systems inside the company able to produce and gather data from its machinery. In particular, when the company was an adopter the purpose was to understand in which kind of process, i.e. planning, production process, management or sales, this data were applied. On the other hand, if the answer was negative, those were called non-adopters, therefore they were asked the reason behind this. The interviewed had four possible answers: the investment was too expensive; the maintenance cost were too high; the company did not need this kind of tools and the last one was a proposition to make the investment by the following three years.
On the contrary, if the answer was positive, the survey continued with the second section that was about data. In particular, they were asked if the company shared data with its suppliers, with its customers and if they purchase data from external firms. The third section was for companies able to produce data; firstly, it was asked which kind of utilization they had for those data, then was analyzed the data usage, when produced, if these were used for the production system, for the supply chain, for the customer care or to expand the company’s activities.

After these questions, the aim was to understand if there were employees or department inside the company specialized on data analysis or if data were analyzed by some external agencies. Then, the link between the business model and the digital technologies was investigated and, as a consequence, a specific question on the topic was rose. Furthermore, it was investigated whether the company made some changes in its business model during the last five years, if they did it through the digital technologies, or, otherwise if they were willing to do it in the following three years. Finally, the questionnaire ended, as mention above, with a question about the company's owner.
The aim of the research is to create a snapshot that summarize the current situation in the Marche region and to understand whether and how this digital transformation is shaping the companies.

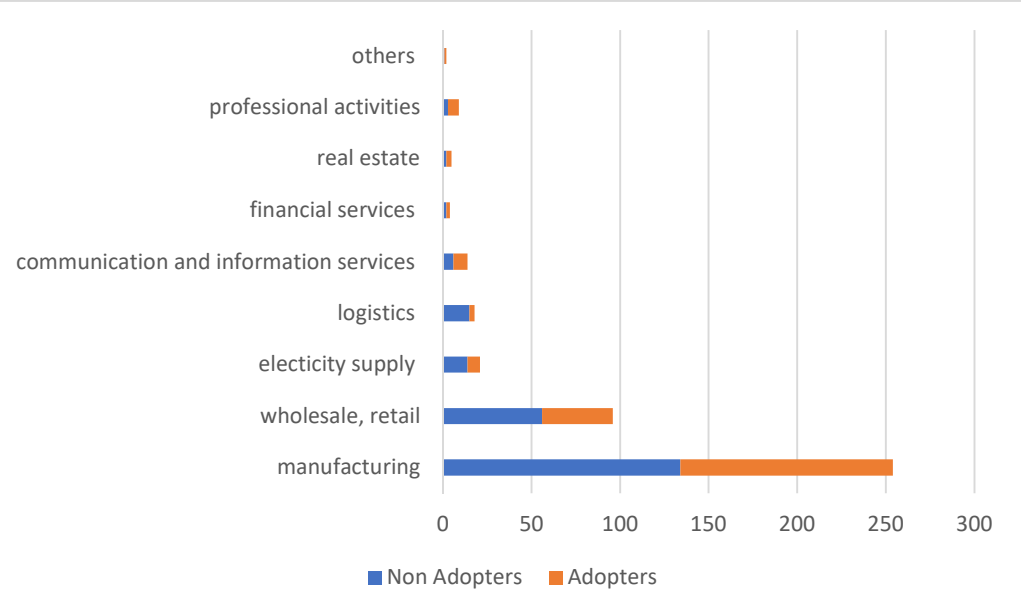
6.2 Descriptive analysis

In total, 425 companies of the Marche region answered the questionnaire. The 81.65% of the total is based in the province of Ancona, 3.53% in Ascoli Piceno, then 41% is settled in Fermo and 7.76% in Macerata, then in Pesaro there is the 5.65% of the total sample.
The majority of companies that replied to the survey belongs to the manufacturing sector, meaning, the 59,76%, (254 firms) of the total are working on this industrial field.



On the whole, 45% were positive answers to the questionnaire, these will be called adopters, while the 55% were negative answers, entitled non-adopters. The last category is composed by the companies that declared not to use or not to be interested in the technologies of Industry 4.0.

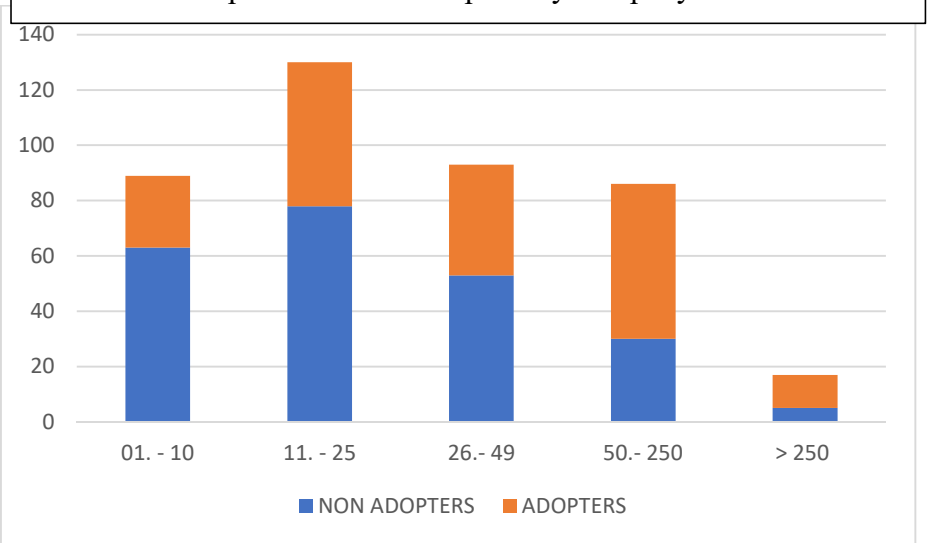
TABLE x. Adopters and Non-adopters by sectors



Considering each sector of the survey the companies are divided in:
60% manufacturing, 22,6% wholesale and retails, 5,5 % electricity and gas suppliers, 4,2 % logistics, 3,2% communication and information services, 2 % professional activities, 1% the financial services and another 1% the real estate and finally the 0,5% is represented by other services suppliers.
As things stand and as shown in the graph, on average in each sector the numbers of non - adopters is higher than the one of the adopters, such as in the manifacturing sector or in the wholesale and retail.
Two exeptions, are worth noting: communication, information services, and professional activities. These concern mainly the engineering activities, technical consultancy and technical testing and analysis but also computer programming activities, data processing and hosting.
As said above, the majority of the sample is composed by manifacturing companies, those represent the 60% of the total respondents, the 47% of those companies have adopted the technologies of Industry 4.0. After that, the 22,5% of the companies are part of the retail, wholesale and sale of cars and light motorveichle and within them the 20% are adopters.
The result for the manifacturing sector are positive, but a lot has to be done, because the non - adopters are still more numerous than the adopters.
According to Susan Helper (2017), despite signs of growth, as also the result of this survey shows, customer demand for Industry 4.0 - based manifacturing environments is still in its very incipiet stages. Furhtermore, David (1990) asserts that this delay can be attributed to the unprofitability of replacing existing plants and equipment and that the acceleration of adoption has to wait for the physical depreciation of capital and a capital formation boom.
In a survey conducted by Federmeccanica emerged that, in the manifacturing sector, robots, big data, nanotehcnologies and smart materials are used by the company of big dimension. On the other hand, cyber security and mechatronic are adopted by small and big enterprises. The 3D printing and the cloud computing are adopted by companies

with a small turnover but with a considerable number of workers. Furthermore, companies that put nanotechnologies, robots and smart material into practical use are situated on the peak of the technological intensity; these are also the ones that, on average, make use of a higher number of thecnologies.

TABLE 4. Adopters and Non-adopters by company's dimension



It was predictable that big companies are more likely to invest and to innovate and the graph above shows this interesting aspect of the survey. In this paragraph, the importance of the companies' dimension is highlighted, and it is expressed in term of workers. The graph shows the relation between the company dimension and the numbers of adopters.

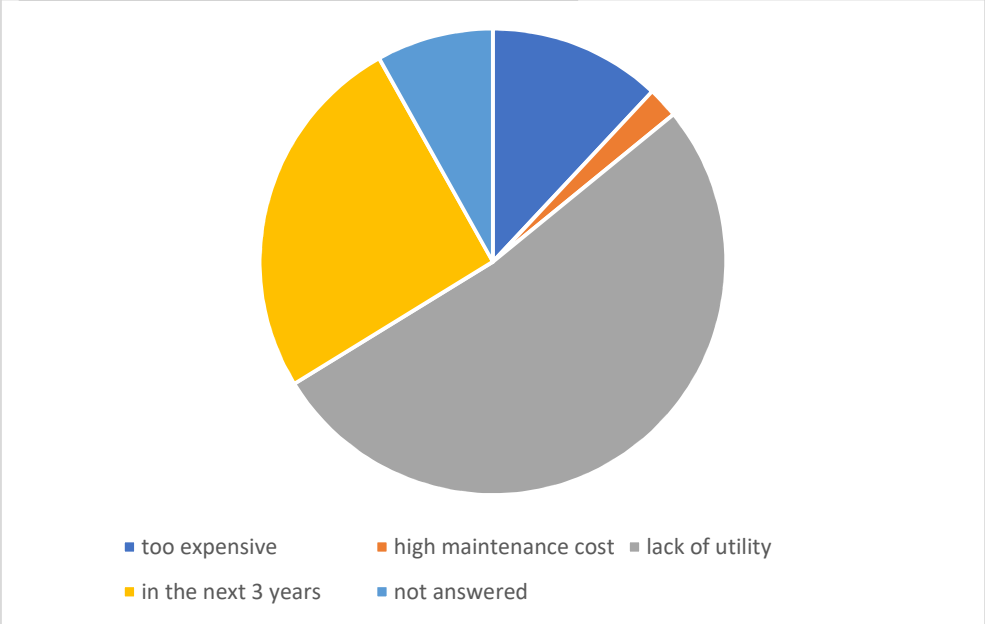
On one hand, there are small companies, composed by 1 to 10 workers and in this case the non-adopters are more numerous than the adopters, i.e., the 70% of the interviewed did not use data nor digital technologies. On the contrary, the number of adopters is directly proportional to the number of workers.

For what concerns the companies with more than 250 workers, the 70% are adopters, i.e., they produce data that can be stored in digital system.

The non- adopters can be clustered in five categories, divided on the base of the questionnaire answers. The first category represents the entrepreneurs believing that the investment is too expensive, and this is the 12%. In the second category there are entrepreneurs that claim at the maintenance costs of the machinery are too high; they are only 2%. The biggest part, 52%, represents the lack of utility answer, that is to say, the people that don't consider useful, for their business, the technologies of Industry 4.0. After that, another important part, 26%, consists of the companies that have already planned to invest on the Industry 4.0 by the next three years. Finally, there is the last cluster, that counts 8%, this is composed by companies that answered only at the first question.

3.2.1 Non- adopters of digital technologies

TABLE 5. Non- adopters by cluster

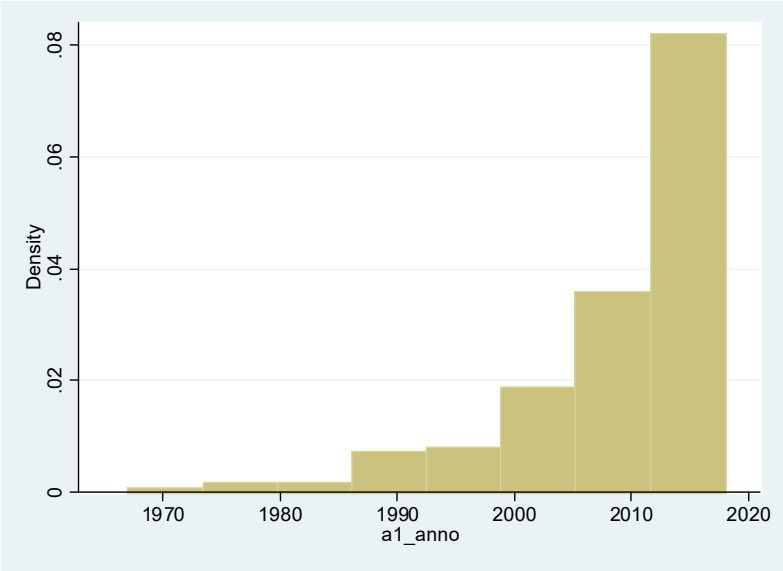


Some of the non-adopters are represented by the hand-crafted firms, that are numerous in the Marche region. They are not interested in the digital technologies because, in their opinion, it is not possible nor profitable for them to use the technologies of the Industry 4.0.

6.3 Adopters of digital technologies

Considering the adopters, data from the survey show that those companies started to produce and to collect data in the 1970s, but these data are probably referred to the management and administration operations as the data produced in the following years until the 1990s.
Additionally, as it is shown in the graph, data production increased at the end of the 1990s however, the peak was reached in the 2016- 2017, since the advent of the Industry 4.0.

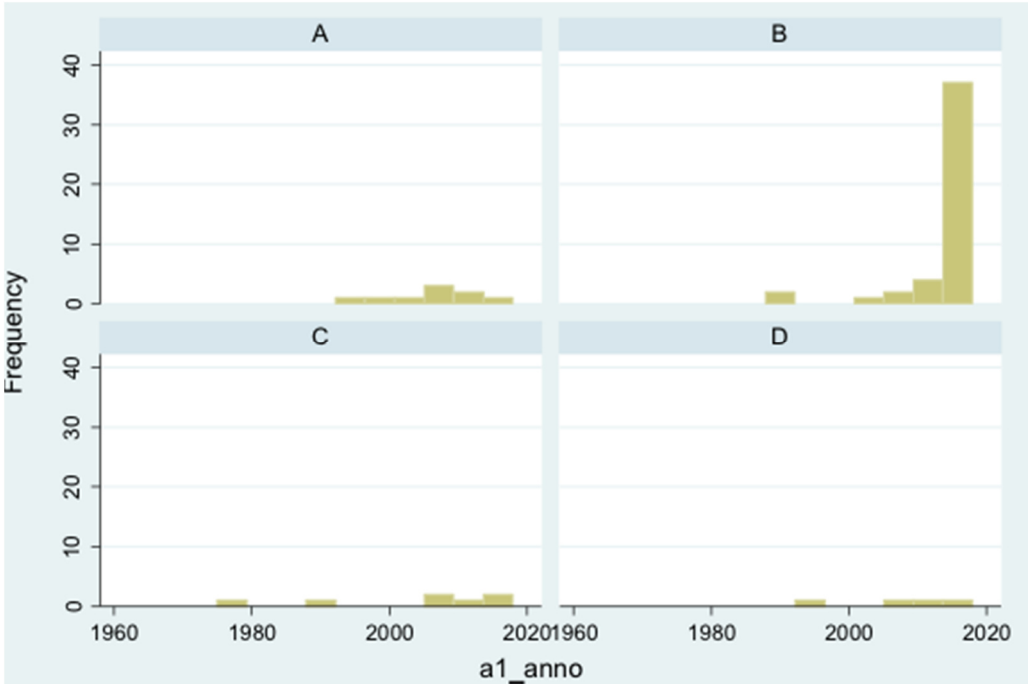
TABLE 6. Period of data production



According to another survey, conducted by KPMG, this boom in Italy is deeply connected with the Piano Calenda. Thus, the Piano Calenda has boost the investments; in particular, companies have taken advantages from the tax relief. After that, it is important to mention that the Italian strategy was to increment the Industry 4.0 investment by applying tax reliefs to the companies that invest. Meanwhile, other countries have adopted other strategies. For instance, Germany, that is considered the "first mover" in Europe for Industry 4.0, has chosen another strategy. This is based on the financing of the research project in a partnership between companies and researchers for the development of new products, with a high digital content, and new technologies. Moreover, this strategy has been adopted also by United States and Japan. The approach of United Kingdom and France can be defined as a " mix" they both have , the tax relief for companies for investments and R&D activities but also the financing of the research projects.

Furthermore, the Italian companies have benefit from the positive trend due to a strength of the economic recovery. Therefore, those data can be referred to the data produced with the digital technologies of the Industry 4.0. In particular, from the interview emerged that the first companies started to use and to adopt the digital technologies approximately in the 2008. The chart above shows this trend of the year of production of the data connected with the digital technologies.

TABLE 7. Data production by sector



In the chart above the major processes are presented in which are used data. It is possible to see, that the biggest part of data concerns exclusively the production activities (section B) 26%. These are continuously generated by machinery equipped with sensors. These data are very important for the predictive analysis, for the predictive maintenance and also as a guarantee that, if the process is run in a certain way, there will be a certain amount of product. Their usage has significantly increased in the last two years. It is important to remark that data stored and utilized in the production process represents the starting point of the digitalization. This demonstrate that companies in the Marche region are at the beginning of the digital transformation. Nevertheless, data are produced and used also in other operations, but with a low frequency. Only the 5% of adopters used data and digital technologies in the design phase (section A), another 5% in the administration operations (section C), and only the 2 % applied data and digital technologies for the relationship with customers (section D). Furthermore, in this chart the case in which data are used exclusively for one operation within the company are presented. Nevertheless, there are cases in which these data and digital technologies are used for different activities, this, in fact, is the aim of the digital transformation. The 37,7 % of the adopters use data for three or more activities, while the 16,2% of companies employ these data for two operation, i.e. the design process and the production activities.

Another important point that came out from the survey is that only the 24% of the companies are willing to share data with their customers and suppliers. This percentage decreases when the numbers of companies that purchase data from some external agencies is added: those represent only the 10 % of the total numbers of interviewed.

In the graph above it is possible to see the average of some indicators for the year 2016. Those indicators are: sales, profit margin, roce and employees. These indicators are used to make a comparison between adopters and non-adopters enterprises. Analyzing the

result, it is possible to say that, as thing stand, for the year 2016, companies adopting these technologies perform better in comparison to the non-adopters. On average, the adopter is bigger than the non-adopter, in terms of employees. In addition, the adopter has a higher sales and profit margin indicator and it is also more efficient because it possesses a greater roce indicator.

TABLE 8. 2016 Trend

2016	SALES	PROFIT MARGIN	ROCE	EMPLO-YEE
YES	20913	4,95	19,75	71
NO	13138	4,58	14,11	37

6.4 Changes in the business model

One aim of the survey was to investigate if there have been some changes in the business model, in particular, if these changes were linked to the digital technologies. The result shows that the 38% of companies changed the business model, and the 59% of these modified it thanks to the digital technologies. Furthermore, the 21% of the interviewed claim that they have the intention to transform the business model in the next three years.

TABLE 9. Business Model and Digital Technologies

IND	Bm modify	Sales	Employees	Total Asset	Profit Margin	ROI	Managers	Trademarks	Patent
	No	19,23	74,8	21,21	4,9	11,5	5,6	1,8	1
	Yes	11,48	64,5	11,71	4,4	21,6	3,9	2,5	2,9
SER	Bm modify	Sales	Employees	Total Asset	Profit Margin	ROI	Managers	Trademarks	Patent
	No	27,61	45,8	32,76	5,1	29,7	3,8	0,2	0,2
	Yes	29,04	76,7	25,97	4,6	23,7	5	0,2	0,1

*SALES are express in thousands

As the chart above illustrates, there is a differentiation between the industrial companies and the service companies in changing their business model.
For what concerns the industrial companies, the number of sales of enterprises that have modified their business model is smaller than the one that did not.
Moreover, also the number of employees and managers in these companies is lower. This finding indicates that companies that changed the business model are smaller with respect to the others. Even the total asset and the profit margin are lower. On the contrary there are three indicators: ROI, trademarks and patents that are higher; this means that companies that have transformed their business model are more innovative and efficient.
On the other hand, in the services sector firms that changed the business model are smaller in terms of total asset and profit margin. Nevertheless, the number of managers and employees is higher than in the firms that did not change the business model. The choice of modifying the business model in these companies could have been an essential requirement for the amelioration of their performances.

7. Some conclusions

As highlighted by Parviainen et al. (2017), digitalization is not about turning existing processes into digital versions but rethinking current operations from new perspectives enabled by digital technologies. Well-known examples of digital transformation include Uber, distributing taxi business, or Airbnb, distributing hotel business. It has been demonstrated that digitalization affects all businesses and its impact will increase in the future. It is important that companies take a proactive approach, rather than waiting to see what will happen or thinking that their current position in the markets will remain the same even if they do not do anything.
The fact that the majority of companies in the Marche region are non-adopters and that there is a big part of non-adopters that is in the “lack of utility” cluster should be seen as a signal. It means that companies’ managements are not aware of the importance of this digital revolution that will affect them anyway, whether they adopt it or not. The main difference is that if entrepreneurs and managers will be ‘smart’ enough to understand this opportunity, they will be able to take advantage from it, to gain in competitiveness with their rival, otherwise they will risk being cut off from the market.
It seems that for what concerns the Marche region in particular, and Italy in general, this ‘delay’ on the digitalization in companies’ digitalization is mostly connected with cultural barriers. Entrepreneurs are not willing to innovate, they are used to the traditional way and as a consequence they don’t want to change it and become “smart factories”. This is mostly due to a lack of information about the advantages that digitalization could bring them. As an entrepreneur said during the interview: ‘I’m producing bolts, I know how to do it in the traditional way, the company is having good performances, I don’t know why I should change all the organization and apply the digital technologies of Industry 4.0”
As suggested by a report written by Pwc (2014), there are three solutions to ‘adapt’ the Industry 4.0, and are: leading, adapting quickly and waiting.

The first solution suggests “acting quickly” while taking risks in order to use the opportunities of digitization early. This of course consists of the co-development of Industry 4.0 ideas and possibly even the creation of actual standards. But on the other hand, this strategy includes the high risk of being a pioneer, so to be the first to develop and implement new and yet untested solutions.
The second solution is “adapting quickly”, in this case companies learn from the initial experience of the pioneers and quickly adapt and implement evidently successful concepts for themselves. The disadvantage in this case is not being able to make use of the full potential of the changes.
The third and last solution is “waiting”, companies waiting for a broad implementation of Industry 4.0 solutions in order to rely solely on already-tested concepts with defined standards and established profitability analysis. This last one seems to be the less risky solution, but there is the possibility that the company drops and this is due to the speedy pace of the global competition.

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