



# National Report

Italy

TUCEP

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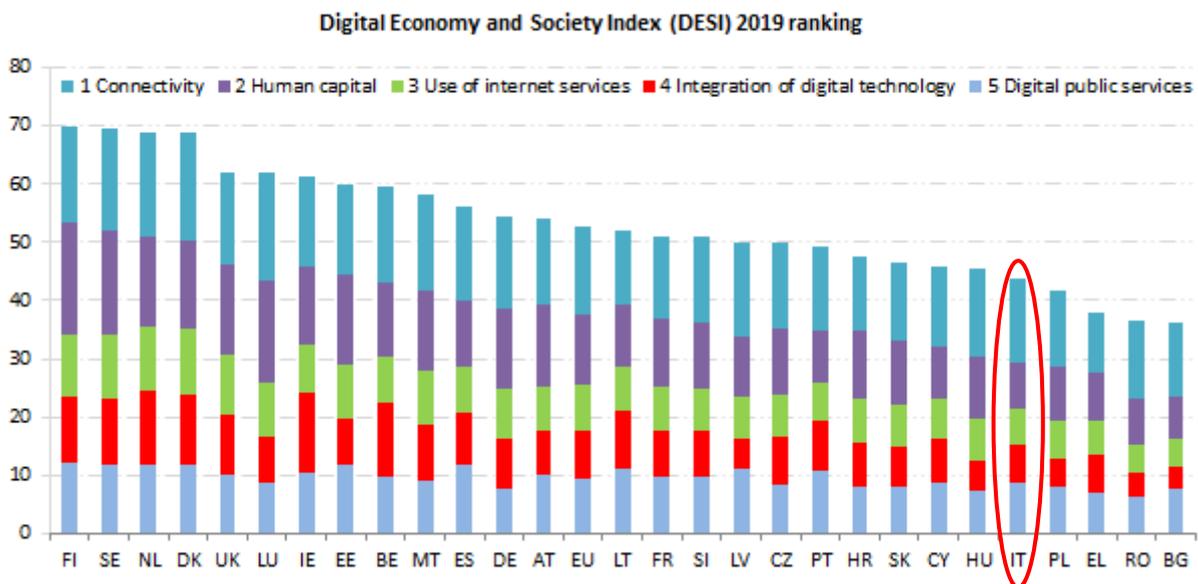
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## 1. Introduction

Italy is the European economy that is accelerating most in the adoption of new digital technologies. At the same time, however, the gap to be bridged with respect to other European countries is considerable: if overall the countries of Southern Europe are clearly behind, in the European comparison Italy is in the area with the lowest digitization and lower productivity growth.

On the basis of the Digital Economy and Society Index (DESI) 2019<sup>1</sup>, Italy is below the European average in all 5 dimensions of the indicator, but with significant differences between their components: while the dimensions "Connectivity" and "Digital Public Services" record values almost in line with the European average, "Internet use" and even more "Human Capital" record modest values that place Italy in a backward position.

These latter dimensions, in fact, present the greatest difficulties and the slowest progress: there is still a large number of citizens who do not use the Internet and significant deficiencies in both basic and advanced digital skills.



<sup>1</sup> Sources: <https://ec.europa.eu/digital-single-market/en/desi>

## 2. Italian labour market: digital transformation and emerging trends

The current technological transformation, based on the interweaving of digitalization and automation of socio-economic relations, is also creating profound changes in the world of work. The challenges facing the world of work in Italy concern the risk of technological unemployment; the quality and conditions of work, with the effects that automation can have on the control and reorganization of times and procedures for task execution; the risk of rising levels of economic inequality, with the more highly qualified workers seeing an increase in employment opportunities and income conditions at the expense of those employed in lower-skilled jobs; the rise of new jobs and new markets characterized by the absence of regulations that can guarantee adequate rights and protection as well as the proper appreciation of work.

These risks come in addition to a series of crucial challenges that the Italian economy and world of work are confronted with, such as the ageing of the population, the need to reduce gender disparity in the labour market, territorial imbalances and the necessity to ensure the sustainable internationalization of economic relations.

At the same time, new technologies provide important opportunities of increasing quality employment, of improving the safety of production processes, of stimulating start-ups and fostering youth employment.<sup>2</sup>

Digitalisation transforms existing jobs, demanding new skills to carry out new tasks, which may imply that the current work force has to be retrained or replaced by workers who already have these skills. There are several studies that estimate job creation and destruction resulting from digitalisation in traditional businesses and industries. Digital skills will be in high demand in the labour markets of the future, as will entrepreneurial skills and creativity.

Digitalisation has a strong impact on enterprises, both in manufacturing and services industries, where converging trends are detectable in the way micro, small and medium-sized enterprises interact with customers and employees. The main factors for successful adaptation are the ability to collect and exploit data, the interconnection of value chains, the creation of digital customer interfaces and mitigation of cyber threats<sup>3</sup>.

### 2.1. Analysis of the labour market

The professionals most requested by Italian companies are those who operate in the digital technology sector. Italian companies need graduates in electronic and information engineering, in industrial engineering. But also technicians and specialists in scientific and information technology disciplines. Profiles with strong digital skills, which, if they are well-paid in the IT sector, are sometimes paid even better in non-tech sectors that have been invested by digital transformation. In particular, the company areas with the greatest difficulty in finding them are those of information systems, design and research and development. The need for tech specialists is concerns not only companies working in the IT sector, but also companies active in other sectors, from legal to manufacturing, from banking to pharmaceuticals.

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<sup>2</sup> The Changing world of work – Digitalization, automation and the future of work (Italian Ministry of Labour and Social Policies)

<sup>3</sup> Impact of digitalization and the on-demand economy on labour markets and the consequences for employment and industrial relations (European Economic and Social Committee)

A study conducted by the European Economic and Social Committee looked at the impact of the digitalisation and on-demand economy on the Italian labour market, and in particular how it changed the roles of employers, employees and organisation of work. This includes enterprises active in traditional businesses and industries as well as platforms and special agents active in the on-demand economy. Based on this study, if digitalisation destroys jobs on a net basis, this would not necessarily lead to structural unemployment. Hence, the working-age population is growing much less rapidly than in the past and is even about to decline in some developed countries, such as Italy.

Anyway, digitalization is likely to bring a lot of opportunities for workers, as flexibility can go hand in hand with more autonomy, more learning, a better work-life balance or even new employment possibilities. For example, workers may achieve a better work-life balance if they can work from home or when it suits them best. In Italy, some trade unions underline the potential benefits of digitalisation for workers in terms of flexibility, autonomy in work, the end of routine tasks and training opportunities.

## 2.2 Prospective of employability

The Italian Government is committed to making sure that the benefits of the present technological transition are spread rapidly and fairly. Interventions such as the Industry 4.0 plan aims to encourage the start-up of new innovative businesses and to foster the technological advancement of the Italian production system. The ultimate objective of this intervention is to improve the capacity of Italian enterprises to generate new, decent jobs that will increase work opportunities for young people and women and contribute to reducing existing territorial disparities. At this regard, the main professionals sought by Italian companies are: graduates in electronic and information engineering, in industrial engineering, technicians and specialists in scientific and information technology disciplines.

Special priority should be given to young people, whose level of unemployment in our Country, despite recent improvements, is still too high. Young workers are becoming increasingly mobile, both spatially and functionally, having to face non-standard kinds of work-such as digital platforms and other new business models-in a panorama where the difference between being employed or self-employed is blurring and where on the one hand opportunities arise to reconcile private and working life and on the other problems arise regarding the discontinuity of employment and social protection.

Based on the discussions and the work carried out by the working table “The Changing World of Work” set up by the Italian Ministry of Labour and Social Policy, potential impacts of digitalisation and automation on the world of work, the economy and society are summarized as follows:

### **Technological unemployment**

Risk of jobs, tasks and duties becoming obsolete and risk of a decrease in the demand for work due to the automation and digitalization of production processes.

### **Enhance and up-grade the skills of workers and enterprises**

Technological transition requires the development of new skills and the up-grading of existing ones to facilitate effective matching between labour demand and supply. Skill enhancement in the labour market and the adaptation of skills to technological progress, at the various professional levels, is essential if the company wants to take full advantage of the economic and production potential of new technologies. Furthermore, a favourable organisational structure is required if workers or entrepreneurs are to use their skills to their full potential. The development and the up-dating of skills of workers and businesses also

requires investment in research training and in the creation of meeting infrastructures to facilitate the technological transfer between companies and the research world.

### **Quality of Employment and work conditions**

Digitalisation and automation impact on the quality and conditions of work, modifying the structure and the composition of the workforce by increasing the demand for highly specialized jobs, production processes and task execution methods (timing, frequency, location, ergonomics, monitoring, health and safety).

### **Youth employment and the school-work transition**

Given the expected growth in demand for new skills and for flexible, dynamic professionals, youth employment should be driven by new technologies. Moreover, Big Data make it possible to significantly improve matching between the demand and supply of new skills and to enhance the infrastructures and systems for career guidance, placement and school-work transition. Exploiting the opportunities related to the diffusion of new technologies could reduce the incidence of NEET.

### **Integrating supply and demand-side and industrial policies**

In order to reach the full economic and employment potential of digitalization and automation it is necessary to effectively integrate labour supply policies, such as skills alignment and enhancement, enhancement of tools to foster matching between labour supply and demand; labour demand policies (reductions and tax and social security incentives); public spending policies meaning public investments oriented towards technology-intensive sectors and products; industrial policies that can encourage companies to do research and make innovative investments and to create infrastructures to stimulate the spread of new technologies. In this context it is crucial that digitalisation and automation technologies are embraced by SMEs and micro enterprises and that these technologies encourage greater integration with the bigger companies.

### 3. IIoT in Italy: concept and current state of implementation

In Italy IIoT is experiencing a phase of great expansion, with most companies having implemented this type of technology or about to do so. On the other hand, however, there are also companies that do not seem to have any interest in implementing IIoT, neither now nor in the future.

In the latter case, the main challenge is related to the approach: companies that are not interested believe that the IIoT is not necessary or a priority within their company, although there are also elements such as lack of skills for implementation and maintenance, economic reasons and data protection concerns. On the other hand, there are significant benefits among companies that have embraced IIoT, including increased productivity, increased process efficiency, cost savings, simplified logistics, reduced delays or interruptions in production, and improvements in product quality. However, some critical issues remain, including the fact that the cost and complexity of the systems, together with the cost of deployment, are obstacles to the implementation of IIoT. The increasing number of connected devices is also creating difficulties for the IT departments of companies, which are having to deal with problems in ensuring data security, maintenance due to the specific skills required and working together on different products.

Overall, therefore, it is clear that the IIoT in Italy is already well established and an integral part of the production structure. Although this is an excellent result, the number of companies that seem to have decided not to embrace IIoT is a cause for concern as it means that they will lose competitiveness in the medium and long term.<sup>4</sup>

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<sup>4</sup> <https://techfromthenet.it/2020/04/14/per-reichert-in-italia-c-e-sempre-piu-internet-of-things/>

## 4. IIoTNet and training needs in Italy

Although Italy has made significant progress in the field of digital transformation, both in private and working life, from the information collected in the aforementioned research and the data processed by the online questionnaires administered to 116 participants, it emerges that the country is still in a phase of development in the use of digital technologies. While a large part of the population uses the Internet for personal use on a daily basis, especially SMEs are lagging behind in adapting to the digitisation of processes, not using a full digital growth strategy. The result is that the road to innovation and digital transformation is still uphill.

In this context, the lack of digital skills by the workers, both managers and employees, is an obstacle to the digitisation of companies, especially SMEs.

Digital literacy is in fact one of the crucial points on which to intervene, reprogramming training, in all orders and grades and ensuring the acquisition, by VET providers, of the knowledge and skills needed to accompany society on the difficult path towards digitization.

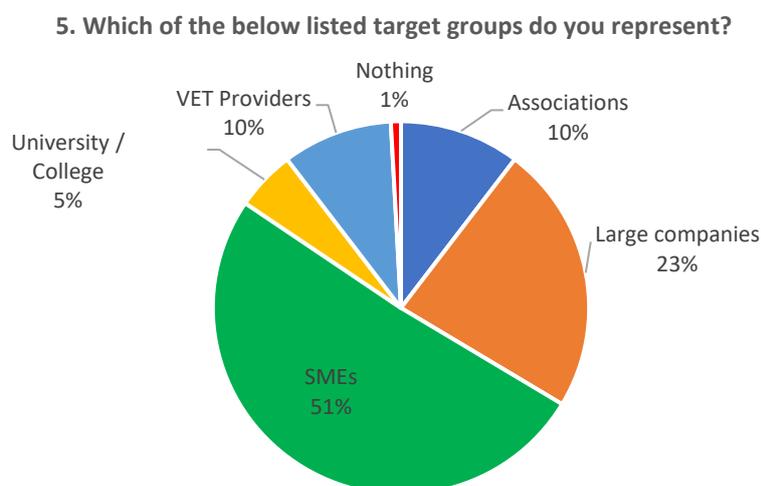
### 4.1 Methodological outline of the empirical research

In Italy, TUCEP reached different target groups in order to collect relevant information about the current situation regarding Industry 4.0, the state of digitisation, the training needs and recommendations. Through our large network at regional and national level and working in close cooperation with several enterprises, VET providers, local authorities, universities, professionals and associations, we were able to collect 116 online surveys filled in by the representatives of abovementioned target groups.

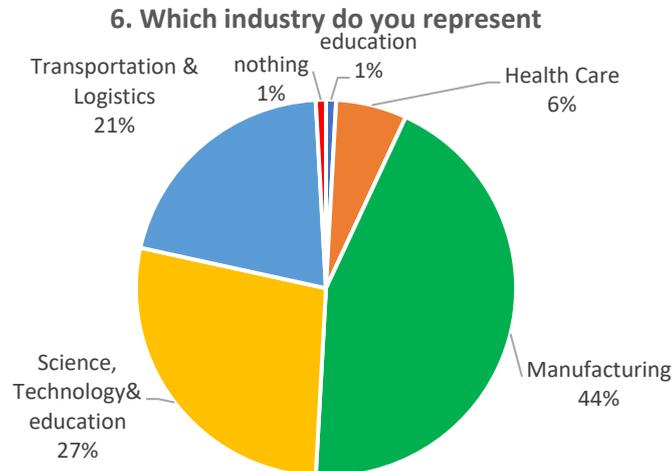
The administration of the online questionnaires carried out by sending emails to the contact persons of large companies, SMEs, associations, VET providers, as well as by conducting telephone interviews with the representatives of the main target groups.

### 4.2 Online survey analysis

The online survey was been filled in by 116 person belonging to the following target groups, as represented in the graph below: half of them represents SMEs, 23% large companies, 10% VET providers, 10% associations who work in the field of Industry 4.0 and technology, 5% Universities/colleges.

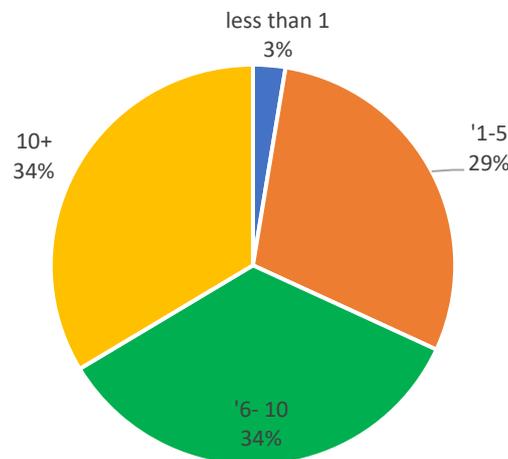


Almost half of respondents (44%) belong to manufacturing companies, while 27% deal with science, technology & education, 21% are working on the transportation and logistics field and the remaining participants belong to the Health Care and Education sector.



Here, the years of experience in the sector of Industry 4.0 stated by the respondents was equally distributed among 1 to 5 years (29% of the companies), 6 to 10 years (34%) and more than 10 years (34%). Only 3% of the respondents stated having less than 1 year of the experience in the sector.

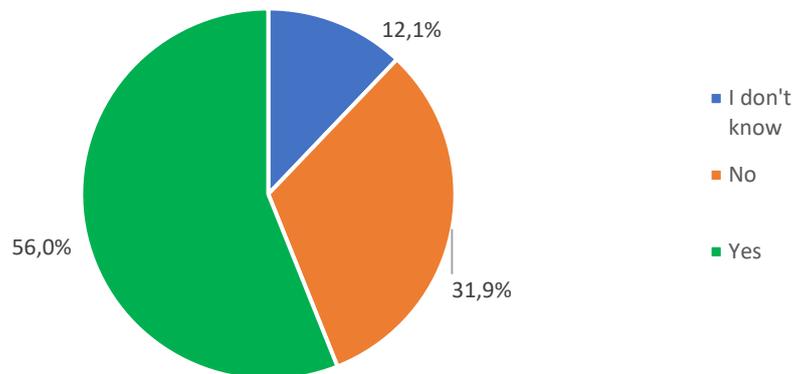
**7. How many years of experience do you have in the sector?**



After presenting an overview about the general information of organisations participating in the survey, data on the topic of the Internet of Things (IoT) are provided below.

As shown in the following table, it emerges that half of respondents (56%) own an IoT product, while 32% of them do not own it. 12% stated they do not know.

### 1. Do you own an Internet Of Things (IoT) product?

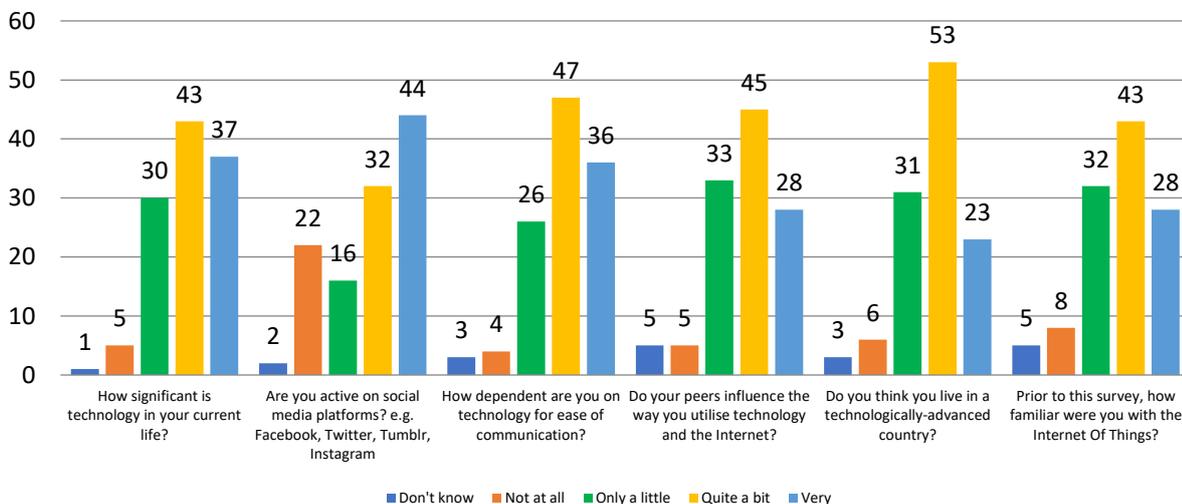


Those who stated to own IoT product, use this technology mainly to Smartwatch, Home monitoring system, Virtual reality headset, Smart thermostat and refrigerator (52%), Smartwatch and Personal fitness tracker (19%), Personal fitness tracker and pet tracker (24%).

The majority of respondents (68%) claim they use an app to manage their IoT devices, while 21 % of them do not use any app.

Based on their personal use of technology and Internet, the most of persons participated in the survey, stated that technology has an important role in their current life especially when they use it in private life (80 out of 116), they are very active in the social platforms (76 out of 116) claiming that they are dependent from technology for easy communication (83 out of 116). 73 respondents stated that their peers influence the way they utilize the technology and Internet. More than half of participants (65%) believe that Italy is a technologically-advanced country, even if someone (26%) think that Italy is just a little bit advanced at technological level. 71 respondents claimed that they are enough familiar with Internet of Thing before to fill in the survey. From the analysis of the first part of the survey, it is clear that the majority of involved people use and are familiar with IoT at personal level living in a country defined technologically-advanced.

### 4. Please answer questions based on your personal use of technology and the Internet



Moving the topic on the Industrial Internet of Thing (IIoT), (*question n.8*) half of respondents were not able to answer about what IIoT is, while 27% of people think that it is something to do with Industry and IoT, and the remaining 25% answered it is the application of IoT in Industry, which allows monitoring and control of industrial “things” and processes. Consequently, (*question n.9*) half of respondents do not know what are the **benefits** from the use of IIoT. On the other hand, those who know the IIoT stated that the most benefits from the IIoT should be the optimization of industrial processes, improvement of goods production and leading to better quality products and services and to more efficient solutions (26%) and that it might help somehow in some industry applications (26%).

As the idea of the Industrial Internet of Things (IIoT) is not well known among the interviewees, more than half of them were unable to answer to the *question n.10* “Do you think the IIoT would help you and/or your enterprise improve your service?”, while 28% of the remaining respondents answered positively and 14% that IIoT cannot improve enterprise services.

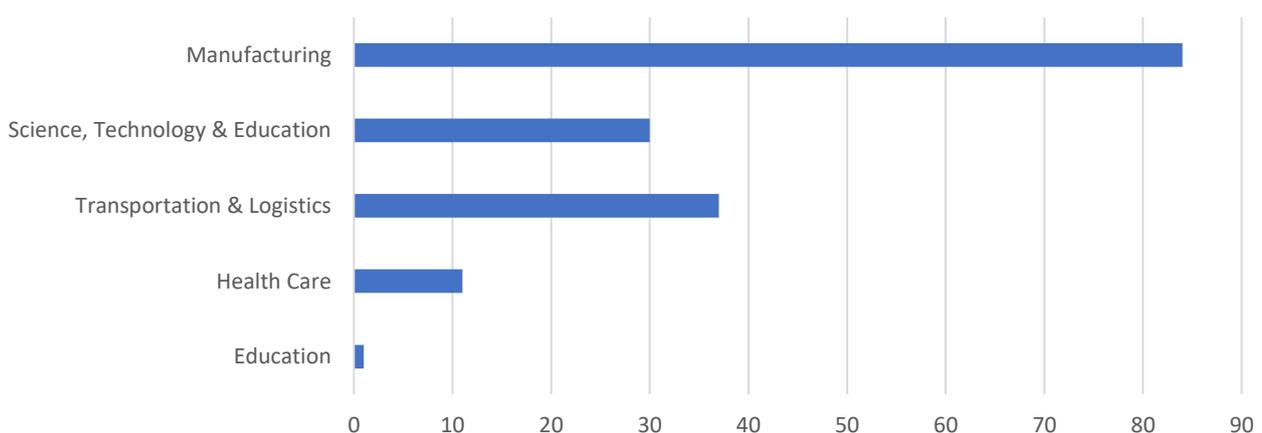
The respondents who know the IIoT, answered to the *question n.11* claiming that the main **problems** of IIoT are linked to standards, security and applications of IIoT in the particular sector (26%), while 22% believe there might be problems with the application of IoT in the Industry. The remaining respondents were not able to identify possible problems.

With reference to the implementation of IIoT in the SMEs, the biggest **obstacles** (*question n.12*) identified by the survey participants are the following:

- Lack of funding (41%)
- Lack of information, such as need education, training, etc.. (34%)
- Lack of interest on the part of management (24%)

As shown in the table below, (*question n.13*) the **main sectors** where IIoT would be more important are manufacturing (51,5%), Transportation & Logistics (22,7%) and Science, Technology & Education (18,4%).

13. In what sector do you believe that the IIoT would be more important? (multiple selection possible)



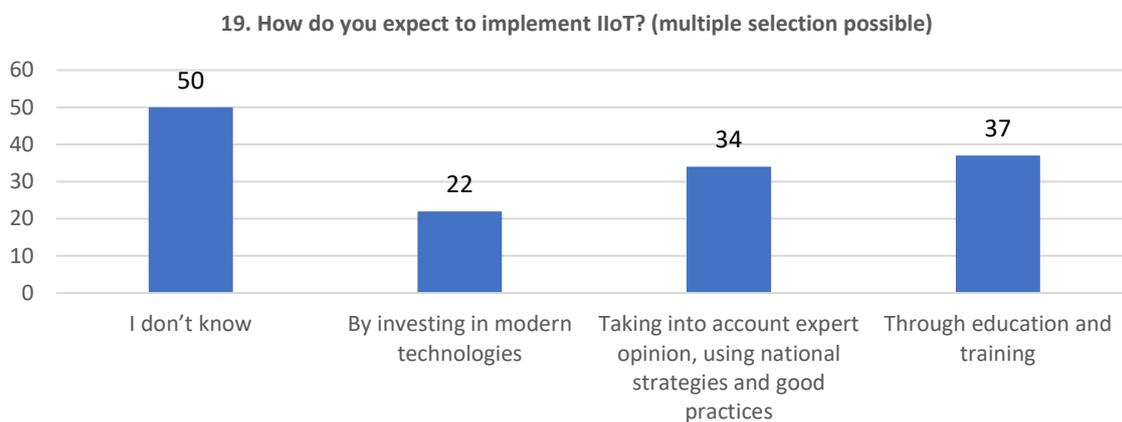
Regarding the necessary strategy for the introduction and implementation of IIoT (*question n.14*), the participants’ answers are distributed among the education and training needs in a enterprise (19%), exchange of experience with enterprises that already implement it (19%) and need a digital officer and department to

implement IIoT (17%). The remaining respondents stated that they do not know what strategy is needed for the implementation of IIoT in the companies.

Half of respondents (46,5%) believe that the management should be responsible for the planning and implementation of the IIoT objectives, but also the IT department, digital officer should cooperate together with the management in the definition of the IIoT objectives (28,5%). The remaining participants were not able to identify who should formulate the objectives (*question n.15*). At this regard, (*question n.16*) the structure suggested by 39% of the participants should analyze the objectives, map them to the available technologies and the budget and follow the priorities, while 20% of participants believe it should look at other organizations and copy their structure. The other participants stated they do not know what kind a structure is needed for the creation and management of IIoT.

In Italy, more than half of respondents (66%) stated that there is not a clear national policy about the Industry 4.0 (*question n. 17*), only 6% of respondents answered positively to this question. The remaining persons do not know. On the same matter, the vast majority of the participants are unaware if there are national IIoT policies in their country (*question n.18*).

As shown in the table below, participants think that IIoT can be implemented in the SMEs mainly through education and training addressed to the staff company (26%), taking into account expert opinion , using national strategies and good practices (24%), as well as by investing in modern technologies (15,5%).

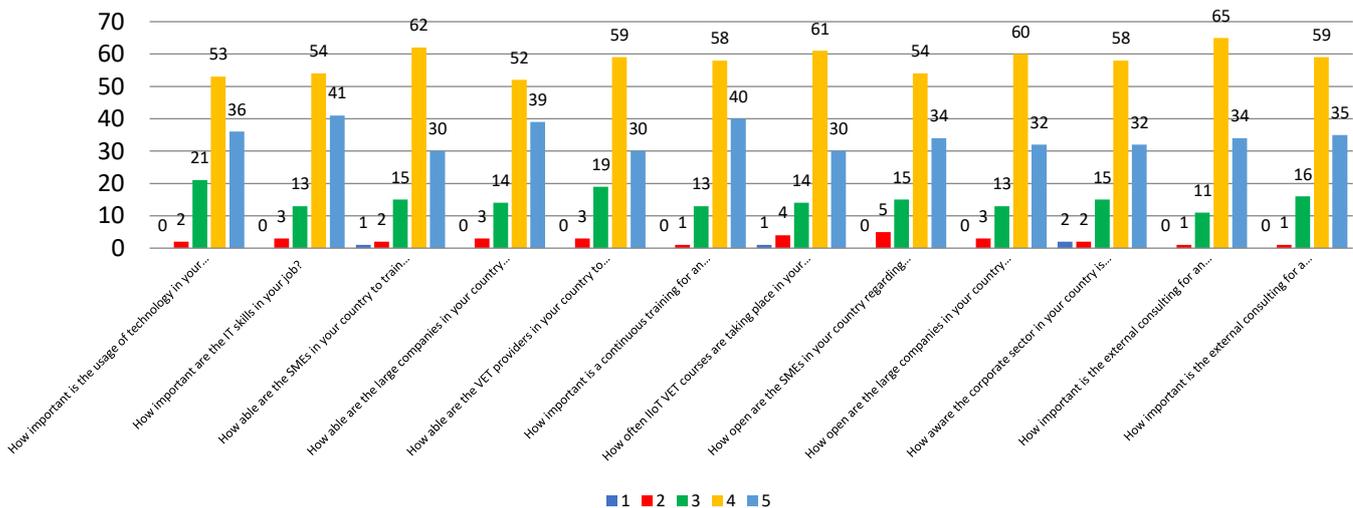


The sample of people interviewed in Italy stated they do not know how many IIoT providers exist in their country (*question n.20*), only 14,5% of respondents heard of some enterprises which provide IIoT technologies. That's why more than half of participants (65,5%) stated to need some courses and training on some issues of IIoT in order to be able to introduce and implement IIoT in their company, and in 28% of the respondents the need to have full training on all issues related to IIoT is very high (*question n.21*).

The vast majority of the respondents stated they do not have specific competences or strengths regarding the IIoT (*question n.22*) apart some respondents who recognised to have ICT competences. On the other hand, they are not able to identify what specific competences they may need for implement IIoT (*question n.23*).

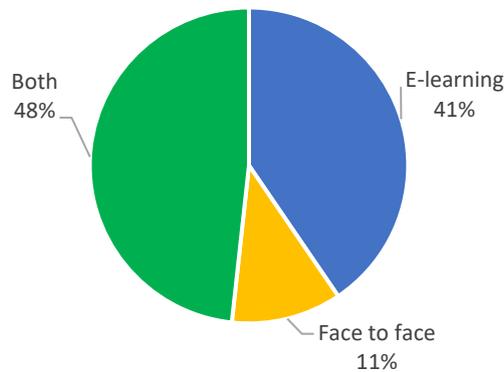
On the basis of 116 collected questionnaires, it emerges that the majority of respondents stated that the usage of technology in their job is important (89) as well as the use of IT skills in the job (95). Regarding the ability of the Italian companies to train their personnel in IIoT issues, most of respondents think that both SMEs (92) and large companies (91) are able to provide the training. They also believe that the VET providers can deliver a complete IIoT training to the companies staff (89). This result is consistent with the opinion of the majority (98 out of 116) who believe that the continuous training of employees is very important for the introduction and implementation of IIoT in the Italian companies. The IIoT courses in the participants' sectors take place quite often (91). Both Italian SMEs (88) and large companies (82) are open regarding the IIoT training, as well as the corporate sector (90) are aware about the importance to train companies staff regarding IIoT issues. The consulting on IIoT topic provided by external professionals are considered relevant both for SMEs (99) and large companies/associations (94).

**Please choose the most suitable answer, rating from 1 - 5 with "1" being the lowest and "5" the highest**



Taking into consideration that the vast majority of participants believe the IIoT training is very important, when we asked them what is the most efficient way of training, half of them answered both e-Learning and Face-to-face, while the remaining respondents preferred only e-Learning (41%) or only face-to-face way (11%).

25. What do you believe is the most efficient way of training?



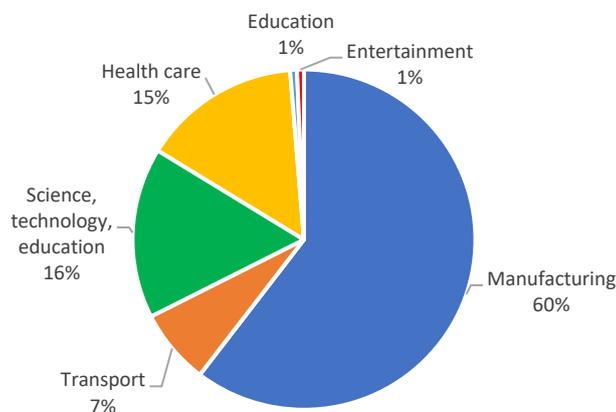
Most of participants do not know if there are any training initiatives on behalf of their company regarding IoT or IIoT or if there are initiatives at national level (*questions n.26 and 27*).

Anyway, the respondents answered that the most efficient training could be courses, webinar, training led by experts including practical activities in order to be able to implement IIoT in the own company (*question n.28*). After having completed the training regarding IIoT topics, participants stated that the following certification should be provided:

- Certificate of attendance (33%)
- Certificate with achieved results (39%)
- Certificate with recommendation / granted rights to continue with additional VET training (26%)

When it comes to the usage of IIoT products, 70% of respondents answered they use them in their job (*question n.30*). More than half of participants stated that the most related industry to their knowledge or interest on IIoT products is Manufacturing (60%) and the remaining answers are distributed among Science, Technology & Education (16%), Health care (15%) and Transport (7%).

31. Which industry is related to your knowledge/interest about IIoT products? (multiple selection possible)



The vast majority of respondents stated that they do not know if there is the need to specify in more details the types of used sensors for IIoT in their industry (*question n.32*). However, half of them (48%) believe it needs to create a regular e-notes to be distributed to the members of IIoT via subscription network (*question*

n.33) to be sent monthly (24% of respondents), half-yearly (16%) and quarterly (10%) (*question n.34*). If regular distribution of e-notes will be provided, 34,5% of participants stated that a designated person on the elected management board of IloT Network should be responsible for the creation and distribution, but also a specific designated person on the Industry level of the IloT Network (25%). The remaining participants stated they do not know who should be responsible for the e-notes creation (*question n.35*).

When it comes to the creation of IloT Network in Europe, 70% of participants see the network at European level with only 25% who believe the IloT Network could be useful only at national level (*question n.36*).

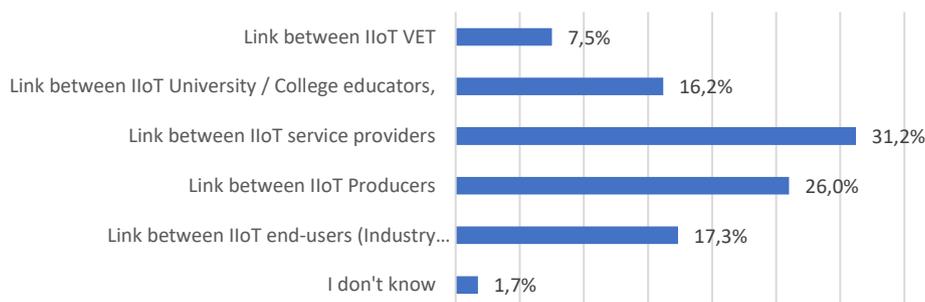
At this regard, to support IloT Network, the partnership will use a dedicated private Social Network and participants believe the most important functions should be the following(*question n.37*):

- Creation of groups per Industry IloT (33%)
- Creation of levels of management for each group of interest (14%)
- Creation of groups per interest on IloT (10%)
- Creation of levels of management for each group of interest, Creation of function keys for feedback intended for upgrade of the IloT Network (9%)

With reference to the best way for conducting the meetings of the IloT Network (*question n.38*) 83% of respondents stated they prefer only e-meeting tools and with 17% who prefer to meet physically in a specific country/town at least once per year. 40% of participants agree to have promotion of products / services related to IloT members on the Website for free, with link to the provider's site (*question n.39*).

As shown in the table below, the core functions of the IloT Network that participants envisage to establish (*question n.40*) are link between IloT service providers (31,2%) and link between IloT producers (26%), with some participants who suggest link between IloT end-users and between IloT University/college educators.

40. Please select the core functions of the IloT Network that we envisage to establish (multiple selection possible):



When it comes to the possibility that Big Data environment can support the IloT (*question n.41*), 31% of respondents stated that it can be useful on a large scale for a full data analysis of IloT data, 27% of them believe the main IloT data will be stored there and 25% only some data will be stored. From the main 4 focused Industries (*question n.42*), 53% of participants believe that the manufacturing industry will generate the biggest amount of data, followed by the Science, technology, education (18%), Health care (17%) and Transport (8%). The opinion of participants about the industry which will generate new data with biggest frequency (*question n.43*) is manufacturing (67%) as expected, followed by Health Care (16,4%) and Science, technology, education (13%).

Regarding the type of network participants expect to use for transferring the data from IIoT devices (*question n.44*), the most preferred is 5G (52,6%) but also Industrial WiFi (33,6%). The vast majority of the respondents does not expect a special ICT architecture to collect the data from their IIoT (*question n.45*) or to use a special methodology for collection of data from IIoT devices (*question n.46*). Most of participants do not see any role of Industry 4.0 in the creation of IIoT Network (*question n.47*).

## 5. Conclusions

Italy is the European economy that is accelerating most in the adoption of new digital technologies. At the same time, our country is in the area with the lowest digitization and lower productivity growth.

The current technological transformation, based on the interweaving of digitalization and automation of socio-economic relations, is also creating profound changes in the world of work. The challenges facing the world of work in Italy concern the risk of technological unemployment, the quality and conditions of work, the risk of rising levels of economic inequality, the rise of new jobs and new markets characterized by the absence of regulations that can guarantee adequate rights and protection as well as the proper appreciation of work.

These risks come in addition to a series of crucial challenges that the Italian economy and world of work are confronted with, such as the ageing of the population, the need to reduce gender disparity in the labour market, territorial imbalances and the necessity to ensure the sustainable internationalization of economic relations.

Although the challenges world of work has to face, new technologies provide important opportunities of increasing quality employment, of improving the safety of production processes, of stimulating start-ups and fostering youth employment. Digitalisation can transform existing jobs, demanding new skills to carry out new tasks, which may imply that the current work force has to be retrained or replaced by workers who already have these skills. However, digitalisation and automation impact on the quality and conditions of work, modifying the structure and the composition of the workforce by increasing the demand for highly specialized jobs.

Although Italy has made significant progress in the field of digital transformation, both in private and working life, the research' results show we are still in a phase of development in the use of digital technologies. While a large part of the population uses the Internet for personal use on a daily basis, the companies, especially SMEs, are experiencing difficulties in fully adapting to the digital transformation, not using a clear digital growth strategy.

From the online surveys analysis, the majority of involved people use and are familiar with IoT at personal level. Moving the topic on the Industrial Internet of Thing (IIoT), it emerges that there is no clear idea and meaning of IIoT among the participants. Consequently, the benefits from the use of IIoT at working level were not identified by most participants. With reference to the implementation of IIoT in the SMEs, the biggest **obstacles** identified by the survey participants are related to the lack of funding, lack of information, such as need education, training, etc.. and lack of interest on the part of management.

For this reason, the majority of participants stated the necessity to attend courses and training on IIoT issues in order to be able to introduce and implement IIoT in their company. The role of VET providers is relevant, by delivering a complete IIoT training to the companies staff. This result is consistent with the opinion of the majority who believe that the continuous training of employees is essential for the introduction and implementation of IIoT in the Italian companies.