

Real Opportunities in the Era of Connectivity

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Abstract

With the advent of digitalization, an integration of smart technologies and operations emerges with the aim to achieve specific strategic business objectives, thus identifying potential interrelations between digital and physical. In this complex scenario, the role of institutions and competences becomes crucial for, respectively, regulating the activities as well as accelerating the pace of education.

Keywords: Smart Technologies; Artificial Intelligence; Industry 4.0; Digital; Global Markets

1. The Role of Investments in Smart Technologies

In 2019, Italy ranked in the bottom places for the European Commission's Digital Economy and Society Index (DESI), with only 92% of people aged between 16 and 24 who regularly use the Internet. Moreover, the Bank of Italy recently declared that we have a consistent digital gap mainly associated with fragmented production structure and limited development of new generation telecommunications networks. Worldwide, the digital sector has the potential to cut global emissions in half by 2030 (WEF, 2019)¹, while 5G is expected to cover up to 65% of the world's population in 2025 (Ericsson, 2019). Meanwhile, Industry 4.0 is already transforming the production with significant consequences in terms of industrial workforce over the next 10 to 15 years. The application of new digital solutions to the smart factory will lead to greater efficiencies and changes in the traditional relationships between humans and machines. According to BCG, the Industry 4.0 ecosystem is composed by nine technologies²:

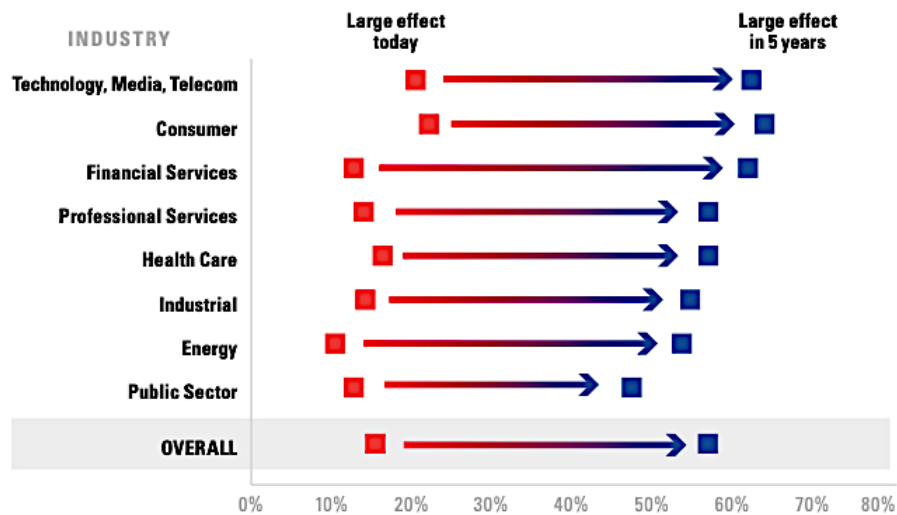
- Autonomous robots;
- Simulation;
- Horizontal and vertical system integration;
- Industrial Internet of Things;
- Cybersecurity;
- Cloud;
- Additive manufacturing;
- Augmented reality;
- Big data and analytics.

As the integration of smart technologies and operations evolves, the interrelations between digital and physical become essential for the achievement of the business objectives. While many industry leaders expect Artificial Intelligence (AI) to

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transform processes, 40% of them expect it becomes a very important driver of productivity improvement in 2030, and almost 30% consider it an important boost for productivity today³. Furthermore, as expected, most organizations estimate that the major effects of Artificial Intelligence occur in the information technology, operations and manufacturing, and supply chain management processes (Figure 1).

Figure 1: *Expectations for Artificial Intelligence Impact on Processes*



Source: MIT Sloan Management Review (2017).

Typically, the main barriers to the Artificial Intelligence adoption can be associated with the training of specific competences (e.g. algorithm development), with the increasing costs for improving products and services, and with the need to change the way in which business value is generated (Ransbotham et al., 2017). However, if properly implemented, recent studies (Ghobakhloo & Ching, 2019) demonstrate that a growing adoption of autonomous robots, industrial sensors or advanced systems like the Enterprise Resource Planning produces higher organizational improvement and productivity. According to Mittal et al. (2019), one of the key benefits related to the use of intelligence systems is the data interoperability within the company. Moreover, the greater the perception about increasing costs, the lower the adoption of these advanced technologies (Ransbotham et al., 2017).

In addition to the AI, the investments in fifth generation networks will amount to approximately \$ 4 trillion between R&D and capital expenditure by 2020 (BCG estimates). Moreover, the Morgan Stanley's "5G Wireless Outlook" states that costs for telecommunications operators will amount to approximately \$ 225 billion globally between 2019 and 2025. Nevertheless, both short- and long-term benefits can be recorded resulting in positive productivity of production factors. Then, the economists estimate that the global economic impact in new goods and services will amount to \$ 12 trillion by 2035, since this advanced technology will allow people, information, and devices to connect each other. Furthermore, a recent research conducted by the Imperial College London shows that, on average, a 10% increase in the adoption of mobile broadband causes a 0.6-2.8% increase in economic growth. In this sense, the higher the levels of connectivity, the greater the rates of economic growth.

In general, there is a wide stream of literature based on the implementation of Industry 4.0 technologies in the manufacturing companies (Schuh et al., 2017; Frank et al., 2019). For instance, a concrete reduction of the time occurring between the event and its response is recorded. Typically, larger firms tend to invest more in process and product innovation, due to their availability in terms of investments in technological infrastructure (Frank et al., 2016).

The rapid development of new technologies creates several threats but also interesting opportunities for companies and individuals. On the one side, the research by Frey & Osborne (2017) reveals that within the next decades, 47% of total employment in the United States will be considered at a high risk of automation – among other industries, the most important effects involve sales, administrative support, services, and production. On the other side, studies suggest that by 2030, the Artificial Intelligence could contribute up to 13.33 trillion euros to the global economy.

Thus, the EU is working on specific priorities like the encouragement of European AI technological and industrial competences to support growth, the training of skilled employment, and the development of new business models. Furthermore, addressing emerging socio-economic challenges and modernizing national education as well as training models appear to be crucial areas of action; in addition, an adequate regulatory environment based on the Union's fundamental rights and on values like privacy, transparency, and accountability should be set up. With the aim to promote these advanced technologies, the European Commission released eleven key points for the promotion of the Artificial Intelligence.

Among others, the investments in AI and its use in different sectors are considered priorities for becoming world leaders. In addition, the growing application of AI can solve the global biggest challenges, respecting citizens' fundamental rights and supporting a global ethical approach. Nowadays, AI represents almost 70% of the global economic impact and its major economic gains will be recorded in China (26% increase in GDP in 2030) and in North America (14.5% increase)⁴. More in general, according to the World Economic Forum (2019), 87% of C-levels believe that Industry 4.0 can offer greater equality and social and economic stability. Unfortunately, only 15% of them believe they are highly prepared for new technologies.

2. Regulating a Digital World

In the context of digital transformation, where platforms and intangible assets rise, even the definition of a regulatory framework controlling these digital activities becomes essential.

Especially, the institutions' main functions are reducing the uncertainty and defining behavioral norms for the stakeholders involved in the network. According to Peng et al. (2009), whether the formal rules do not work properly, the informal ones emerge. In this sense, with the implementation of specific European projects, the institutional intervention enables the single markets to work on common initiatives in support to the advanced technologies. For instance, Italy is realizing the so-called "Fabbrica Intelligente" through the creation of digital platforms, manufacturing communities, innovation hubs, and competence centers. At the same

European level, also France, Germany, and Sweden are active respectively with “Platform Industrie 4.0”, “Alliance pour l’Industrie du Futur” and “Produktion 2030”.

Strategic and transversal interventions involve the areas of human capital, research and development, and international presence. In order to accelerate the national transformation, it is essential to coordinate the innovation among industry, academia, and government. The future challenges for the progress of Industry 4.0 can be summarized as follows (Buhr, 2018):

- Creation of suitable funding programs and strategies in order to increase the local competitiveness;
- A more systematic cooperation and exchange of good practices;
- Focus on innovation performance and R&D expenditure (e.g. Digital Innovation Hubs and enterprise platforms);
- Development of human capital skills and integration of human-machine interfaces.

Following the example of Germany, where the investments in human capital and innovation are prevalent, the need for Italy to reinforce the research in new technologies and human capital through the establishment of direct interaction between small and medium enterprises and government arises.

3. Accelerating the Pace of Education

The adoption of new generation connectivity tools requires that adequate digital skills be developed. A survey conducted on a sample of 11 countries shows that 87% of companies on a global scale believe that greater connectivity will be strategically important for the management of their business by 2023 (Osborne Clarke). However, for 42% of respondents, competences still represent a significant barrier. In the digital scenario, almost 50% of global work activities are expected to be automated by 2055 (McKinsey) and the same automation can impact up to 60% of company duties in Italy, thus affecting approximately 11 million of workers. However, it is also true that only 22% of workers recognize that their leaders have a clear digital strategy in mind. For these reasons, the role of education becomes decisive for the creation of more fluid and agile companies and training cultural models. Moreover, the challenge of the new leaders is to accelerate learning, to identify talents, to involve them continuously, and to generate a societal impact. These are the key strategies for achieving a sustainable competitive advantage.

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Notes

- ¹ <https://www.weforum.org/agenda/2019/01/why-digitalization-is-the-key-to-exponential-climate-action/>
- ² <https://www.bcg.com/it-it/capabilities/operations/embracing-industry-4.0-rediscovering-growth.aspx>
- ³ <https://www.bcg.com/it-it/publications/2018/artificial-intelligence-factory-future.aspx>
- ⁴ <https://www.strategyand.pwc.com/gx/en/insights/industry4-0/global-digital-operations-study-digital-champions.pdf>