AI: Possible Developments and Ethical Implications in the Global market.

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Abstract

Artificial intelligence (AI) is a branch of computer science that deals with the development of hardware and software systems that can replicate typical human abilities, such as interaction with the environment, learning, adaptation, reasoning, and planning. These systems are designed to make decisions autonomously, performing tasks that typically require human intervention.

Despite the complexity of the technology, the concept of Artificial Intelligence is simple: it is about developing systems that can learn and adapt autonomously, inspired by human learning models.

Artificial intelligence represents one of the greatest technological revolutions humanity has ever faced. From Machine Learning techniques to Robotics, including Neural Networks, AI is based on a deep human aspiration: to create a "machine" capable of reflecting its own capabilities. The fields of application of this technology are countless, with the potential to profoundly transform the world of business and public administration, as well as significantly improve people's lives. However, ethical and philosophical questions related to the use of AI are also emerging.

It is important for the technological development of our industrial fabric to understand how widespread AI is already in the Italian and European context and how ready Italy is to face this transformation. What role can Italy play in the artificial intelligence value chain?

However, in addition to the many benefits, artificial intelligence also comes with some risks. The main risks are related to the loss of control on the technology, the misuse of AI, or the replacement of human labor in many sectors, with serious economic and social repercussions.

The issue of the risks arising from the use of AI is closely linked to that of ethics: AI can inherit biases from the data on which it is trained, leading to discrimination or unfair decisions. It is therefore essential to establish ethical, transparent and accountable systems that respect human rights and freedoms.

All things considered, on 13 March 2024, the European Parliament approved by a large majority the AI Act, the world's first regulation on artificial intelligence. The AI Act was drawn up with the aim of respecting fundamental human rights and ensuring the development of the economies of member countries through forms of support for businesses.

After analysing the state of the art of AI deployment in Italy according to the latest data from 2023 from the Observatory of Digital Innovation in SMEs, the study focuses on the analysis of the AI law and the significant impact that this regulation will have on competitiveness between Europe and the rest of the world, as well as on the influence on the design choices of Italian companies.

Keywords: Artificial intelligence, ethics, innovation, AI act.
Jel classification: = *O19, O32, O33, O38.*

1. INTRODUCTION

The idea of a thinking machine has evolved over time under the influence of philosophical and scientific concepts. One of the founding fathers of artificial intelligence (AI) and computer science is considered Alan Turing. In 1950, in his famous essay "Computing Machinery and Intelligence", introduced the famous Turing test, a test that proposes a criterion for evaluating the intelligence of a machine. This idea marked a milestone in the development of AI, shifting the debate from the simple computational capacity of machines to the concept of simulating human thought.

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Turing was among the first to suggest that, through algorithms and computational processes, machines could emulate human learning and reasoning. His ideas laid the theoretical foundation for many of the subsequent developments in the field of AI and machine learning.

The origins of Artificial Intelligence (AI) cannot be attributed entirely to Alan Turing, but his contribution was fundamental. However, the development of AI as a science and technology discipline has been the result of contributions from many other scientists and researchers (Wiener, McCarthy, Minsky, Shannon, Rochester, Herbert, Allen).

About 50 years ago, in 1956, a seminar took place at Dartmouth College that marked the official beginning of Artificial Intelligence (AI). This event is remembered as a historic moment because the term "Artificial Intelligence" was first introduced, during a series of meetings and discussions organized by John McCarthy, Marvin Minsky, Nathaniel Rochester and Claude Shannon[4].

The atmosphere of that era was characterized by great enthusiasm for the technological possibilities offered by the advent of computers. These machines, capable of performing logical operations and manipulating symbols, seemed to promise the approach of the creation of intelligent systems capable of simulating human thought. The concept of "artificial intelligence" dreamed of a future in which machines could solve complex problems, learn autonomously and behave in a similar way to humans[5].

However, despite the initial euphoria, the development of AI has proven more complex than expected, with numerous challenges and limitations leading to periods of stagnation, often referred to as "AI winters" (the decline in interest in AI became evident around 1970s and 1980s). Only in the last few decades, thanks to advances in computational power, data availability and advanced machine learning techniques, has artificial intelligence begun to realize some of those initial ambitious expectations.

2. THE STATE OF THE ART OF ARTIFICIAL INTELLIGENCE.

In recent years, AI has spread across various industries following the rise of AI and Machine Learning (ML)-based tools, applications, and platforms. These new technologies have had a major impact in a variety of contexts such as healthcare, robotics, automation, and many other fields.

Many companies are investing in AI research to discover possible new applications that will bring artificial intelligence closer and closer to humans. By 2025, AI software revenue alone is expected to reach more than $100 billion globally[6].

According to data from MarketsandMarkets (2024), the global AI market was worth around €137 billion in 2023 and is expected to grow at an impressive compound annual growth rate (CAGR) – around 37% – until 2030, reaching a value of more than €1200 billion.

If we look at the data related to startups and venture capital, we can understand the importance of the AI market:

- in the last 5 years, there have been more than 150 unicorns (startups with a market valuation of more than one billion dollars) in the AI sector,

- in 2023, one in five unicorn startups belonged to the AI sector (generative AI companies in the text, translation, video, coding and human-computer interaction sectors).

The most valuable private companies in the sector (Crunchbase 2023 data) are: Databricks, an AI cloud data company, valued at $43 billion, autonomous driving start-up Cruise, valued at $30 billion, generative AI company OpenAI, valued at $29 billion, Mistral AI, a French generative AI startup (European rival to OpenAI), which reached unicorn status after its latest funding round in December 2023, valued at around $6 billion.

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The study shows that the main drivers of this huge expansion of the AI market are growth in adoption of autonomous artificial intelligence, rise in technological advancements and innovations, and advancements in deep learning and growth of data-based artificial intelligence.

On the contrary the biggest restraints are shortage of skilled artificial intelligence professionals, and issues related to data availability and quality

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[4] McCarthy et al. (1956).
[5] Starnini, Domenico, Aldinucci, M., Cantalupo, B., Iaia, L., & Pironti, M. 2023, Ballatore, Simone, 2023
[6] https://makerfairerome.eu/it/lo-stato-dellarte-dellai-progressi-sfide-e-prospettive future/?doing_wp_cron=1733596874.9409151077270507812500,
Lo stato dell'arte dell'intelligenza artificiale: progressi, sfide e prospettive 2024.
[7] Crunchbase Unicorn Board, 2023, https://news.crunchbase.com/unicorn-company-list/

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According to the 2024 IA index report, in 2022, the bulk of AI patents granted globally (75.2%) came from East Asia and the Pacific, with North America being the second largest contributor at 21.2%., as the figure 1 shows. Until 2011, North America led the way in the number of global AI patents. However, since then, there has been a significant shift towards an increasing proportion of AI patents originating from East Asia and the Pacific.[9]
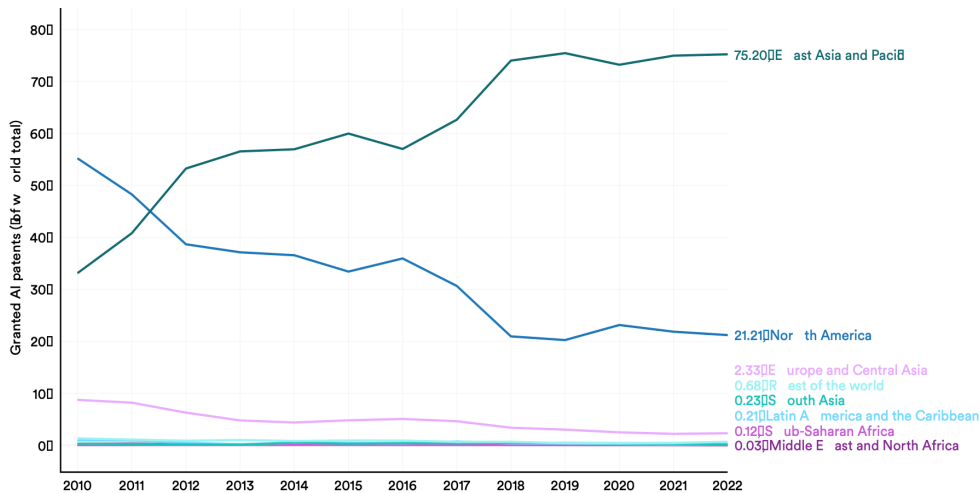

Fig. 1 Source: 2024 AI index report

Shifting the focus to our country, in Italy, based on 2023 data published by ANITEC-Assinform and the TIM/Intesa San Paolo Innovation Center, the AI market reached a volume of around €500 million in 2022 and the expected growth rate for the period 2023-2027 is estimated to be in line with what has been observed worldwide with an average annual growth of 38%.

In fact, 2023 saw a rapid acceleration in the development and deployment of AI-powered tools. The artificial intelligence market in Italy jumped in 2023 reaching +52%, and a value of €760 million. For this reason, the year 2023 was named the Year of AI.

90% of this value is due to large companies, while the remaining share is distributed in an essentially balanced way between small and medium-sized enterprises and public administration. Generative AI has seen a rapid diffusion, marking a technological turning point with broad applications in different fields and industrial sectors[10].

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[8] Crunchbase, op.cit

[9] Index global report 2024, https://www.global-index.ai

[10] Aspen, Rapporto sull'intelligenza artificiale, 2024.

Fig. 2 Source: Aspen, Rapporto sulla intelligenza artificiale, 2024

Despite the leap forward made by Italy in the AI sector, to a European comparison, it should be noted that Italy has a VC market-to-GDP ratio of 0.06%, compared to 0.25-0.30% for other European benchmark countries.
Italy invests less than Spain, Germany, France and England in venture capital and, from a digitalisation point of view, it still must close the gap with the other EU states. For this reason, the government has made available to CdP Venture, a significant endowment of financial resources, with the aim of stimulating investments in technology, the birth of companies and products and a surrounding ecosystem.
The main reasons for investing in AI, according to a study conducted by Minsait-Luiss, are attributable to greater operational efficiency, customer loyalty and the transformation of the business model or the offer of products and/or services.
On the other hand, the greatest obstacles to investment, as shown by the Minsait-Luiss study, are the absence of adequate technological infrastructure (65%), apart from the banking sector where 80% of companies are already equipped with this technology, preference for the storage of market-sensitive data "in-house", limiting itself to "hybrid" infrastructures without completely moving them to the public cloud, use of on-premise infrastructures (90), managed via local networks, or hybrids, low knowledge of the legislative framework (60%) and fear of its instability (13%), presence of an AI development plan consistent with business strategies (only 22%), lack of AI skills and professionals (19%).

3. RESPONSIBLE AI

Today, the adoption and integration of AI within companies has reached a level of unprecedented relevance. At the same time, there is a growing awareness of the ethical and social risks associated with this technology. With the aim of reducing or eliminating these risks while ensuring the implementation of AI technology, the European Union first proposed and subsequently approved the AI Act, a regulation that requires companies to adopt responsible approaches (with a focus on the use of AI for use cases with significant impacts on people's health, safety and rights) to address society's growing ethical concerns arising from non-correct technology.
The AI Act is the first-ever legal framework on AI, addressing the risks of AI and putting Europe in a global leadership position.
The AI Act (Regulation (EU) 2024/1689) establishes harmonized rules on artificial intelligence, providing AI developers and operators with clear requirements and obligations regarding the specific uses of AI. At the same time, the regulation aims to reduce the administrative and financial burden on businesses, small and medium-sized enterprises (SMEs). The AI Act is part of a broader set of policy measures, aimed at supporting the development of trustworthy AI, which also includes the AI Innovation Package, and the Coordinated Plan on Artificial Intelligence.
In March 2024, the AI Act, the result of the agreement reached with Member States in December 2023, was approved by 523 votes in favour, 46 against and 49 abstentions. Coming into force on 1st August 2024, the law mainly aims to protect fundamental human rights and encourage innovation.
By 2nd August 2025 member states must designate national competent authorities, which will monitor the application of the rules. The European Commission's AI Office will be the main enforcement body for AI legislation at EU level. Most of the rules of the AI Act will start to apply on August 2, 2026. The bans on AI systems deemed to pose an unacceptable risk will already apply after six months, while the rules for so-called general-purpose AI models will apply after 12 months.

And it is on the issue of risks that the legislator has focused most to regulate the risks generated by AI, to prevent AI practices that pose unacceptable risks, establish a list of high-risk applications. establish clear requirements and specific obligations for AI systems for high-risk applications and specific obligations for operators and providers of high-risk AI applications; require a conformity assessment before a given AI system is put into service or placed on the market; establish a governance structure at European and national levels[11].
The European law divides the risks related to AI into four groups:
Unacceptable risk: Systems that are considered a clear threat to people's fundamental rights are prohibited (subliminal, manipulative, or exploitative techniques that harm decision-making or exploit vulnerabilities, biometric categorization of sensitive attributes unless lawful or for specific uses, harmful social scoring based on behavior or traits); high risk: AI systems are subject to strict obligations before they can be placed on the market (e.g. transport, training, employment); limited risk: risks related to the lack of transparency in the use of AI, zero risk: the AI Act allows the free use of AI with minimal risk (applications such as video games).
Most obligations fall on providers (developers) of high-risk AI systems. Users are individuals or entities that operate an AI system in a professional context. While users of high-risk AI systems have certain obligations, these are less extensive than those assigned to providers (developers). This applies to users located in the EU, and third country users where the AI system's output is used.
All GPAI Providers: Must provide documentation, usage instructions, comply with copyright, and publish training data summaries, while free/open License Providers only need to meet copyright rules and publish data summaries unless they pose systemic risks. Systemic Risk GPAI Providers must also evaluate models, test against adversarial threats, report incidents, and ensure cybersecurity.
The regulation of artificial intelligence applications is crucial to ensure the safe and responsible use of this advanced technology, with the aim of building a future in which AI becomes a reliable ally that respects human values. By doing so, you will help create a safer and more ethical digital environment for everyone. The central point is to find a balance between technological innovation and the protection of human rights, a goal that requires the continuous commitment of all those involved.

4. AI: ETHICAL IMPLICATIONS ON THE GLOBAL MARKET

Artificial intelligence (AI) is a driving force behind technological and societal change, with profound implications for the global market. Its applications promise unprecedented benefits in terms of operational efficiency, service customization, and error reduction. However, this technological revolution brings with it ethical challenges that require constant attention from businesses to ensure responsible and sustainable use of technology[12].
The adoption of AI allows companies to analyze large amounts of data, improving customer engagement through increasingly personalized experiences. However, these innovations present critical issues mainly related to privacy and transparency in the management of personal data, which can generate concerns among consumers[13].
One of the central problems is algorithmic biases, which can lead to unintentional discrimination against certain social groups. These biases, often inherent in AI models, raise ethical questions related to the fairness and accountability of companies[14]. Solving these issues requires the development of transparent and inclusive algorithms, capable of respecting fundamental principles such as fairness, transparency and non-discrimination[15].
The European Commission underlines the importance of corporate social responsibility, understood as the voluntary integration of social, environmental and ethical considerations into business strategies[16]. This approach is particularly relevant in the context of AI, where building trust between businesses and consumers is a key element.
Companies must adopt governance practices that ensure the integrity and security of AI systems. The ethical principles related to AI are articulated on three main levels: the product, the consumer and society[17]. At the company level, commitment to reskilling and mitigating the negative impacts of automation is essential to address changes in the labor market[18].
The global adoption of AI requires a clear and balanced regulatory framework that fosters innovation and accountability. The design of AI systems must pursue not only economic goals, but also social and

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[11] Legge sull'IA, https://digital-strategy.ec.europa.eu/it/policies/regulatory-frameworkai.
[12] Commissione Europea, *Linee guida sull'etica dell'IA*, 2020.
[13] Courtland R., "Bias detectives: The researchers striving to make algorithms fair", *Nature*, 2018.
[14] Du Shuili e Xie Chunyan, *Paradoxes of Artificial Intelligence in Consumer Markets*, 2021.
[15] Zou J., Schiebinger L., "AI can be sexist and racist—it's time to make it fair", *Nature*, 2018.
[16] Commissione Europea, *Responsabilità Sociale d'Impresa*, 2011.
[17] Du Shuili e Xie Chunyan, op. cit.
[18] PWC, *Will robots really steal our jobs? *, 2018.

environmental goals[19]. For example, ethical use of the data collected can prevent misuse and strengthen consumer trust[20].

Transparency in decision-making processes is another crucial aspect. Companies must provide clear information on the use of data and the effects of algorithmic decisions. This approach can not only reduce consumer concerns but can also become a competitive advantage for businesses[21].

Artificial intelligence represents an extraordinary asset for the global market, but its implementation must be accompanied by ethical and responsible management. Companies must integrate principles of fairness, transparency and sustainability into their operational strategies to ensure that AI is not only a driver of economic growth, but also a tool for social and ethical progress.

5. CONCLUSIONS

AI governance is essential to ensure the adoption of AI technologies aligned with corporate goals and values, as well as to promote ethical, responsible, and trustworthy use, in a context of increasing global regulatory uptake and debate.

To address the new risks related to AI, it is crucial to adopt a risk-centric approach that integrates risk management into the most affected business areas (marketing, legal/privacy, IT, R&D, etc.). This requires re-evaluation or the introduction of risk management processes to prevent issues such as incorrect outcomes, bias, lack of transparency, data breaches, and cyberattacks.

Responsible risk management demonstrates accountability and builds trust with stakeholders and consumers. Additionally, robust data governance is critical to ensuring legal compliance, internal standards, and data quality, avoiding biased or unreliable outcomes that can undermine the effectiveness of AI.

Adopting AI is not just a technological or business choice but requires alignment between business goals and ethical use that complies with emerging regulations, such as the EU's AI Act.

Considering that the overall effect of the introduction and full adoption of artificial intelligence is a positive factor for the development of our country's economy and for job growth, a plan is proposed articulated around several lines of targeted and concrete actions, which call for both public intervention and public-private collaboration.

First, it is necessary to accelerate the growth of the "technology quotient" of the new workforce by:

The correct orientation of the new generations, increasing their level of awareness of the impacts that generative artificial intelligence will have on the world of work in the years to come, thanks to diffuse and ubiquitous information on the "jobs of the future" and the knowledge of the professions that will be reduced over time and that will instead guarantee high levels of "employability".

The creation of specific training courses dedicated to Artificial Intelligence and Generative AI: within universities and higher technical institutes. To date, only 50% of universities have activated a complete course dedicated to Artificial Intelligence. Obviously, there are excellences, but the offer must continue to grow and become omnipresent. It is also to retain more and more of our young talents in Italy. Stimulate enrolment in ICT degree courses to enable the adoption of generative AI solutions in the Italian economic fabric.

Second, training of the current workforce must be implemented by both the public administration and individuals. Training must be oriented towards the development of skills related to the professions of the future.

Third, it is necessary to spread a corporate culture focused on AI-based innovation, which includes employees in decision-making processes not only informing them but involving them in the implementation of technological change through adequate training that becomes an integral part of one's professional growth and that of the company.

Forth, accelerate the digitization of businesses, with a focus on small and medium-sized enterprises, with financial support from the government.

Ultimately, it is crucial to adopt an ethical attitude in using AI technology to reduce legal risks, build trust, improve reputation, increase customer satisfaction and loyalty, and consequently increase productivity.

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