TRUSTWORTHY AI AND THE EU AI ACT: MARKET ANALYSIS

BDV BIG DATA VALUE ASSOCIATION

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EXECUTIVE SUMMARY

The European Artificial Intelligence (AI) market stands at a critical juncture, defined by the complex interplay of groundbreaking regulation, rapid technological evolution, and intensifying global competition. With the adoption of the AI Act, the European Union (EU) has become the first jurisdiction to implement a comprehensive, risk-based framework for AI. This legislative milestone, alongside the Data Act and Data Governance Act, establishes the EU not merely as a regulator, but as a potential global standard-setter for AI. However, regulatory leadership alone does not guarantee market dominance. The durability of the EU's position depends on whether this governance framework can be matched by scalable investment, the retention of top-tier talent, and the creation of a unified market for data and innovation adoption.

EU's strengths are many. They lie in a deep industrial base within safety-critical sectors such as healthcare, finance, and manufacturing, combined with world-leading research in AI ethics, explainability, and risk governance. Early exposure to the AI Act offers European firms a distinct "first-mover" advantage, positioning them as the global suppliers of choice for responsible, transparent, and secure AI solutions. Although all these aspects should position EU with a strong competitive advantage, several structural weaknesses counterbalance the situation. A fragmented ecosystem across national borders, and a chronic shortage of late-stage venture capital limits the capacity of European startups to scale globally. This funding gap, coupled with the migration of skilled talent to North America and Asia, poses a significant challenge to long-term competitiveness. Furthermore, dependence on external providers for critical stack layers exposes the EU to strategic vulnerabilities and systemic risks.

The outlook, therefore, is one of conditional opportunity. To succeed, the EU must ensure that regulation functions as a catalyst for innovation while protecting fundamental rights, rather than a bureaucratic constraint. This requires a holistic strategy: mobilising capital to bridge the growth-stage funding gap, facilitating compliance for SMEs, and aggressively investing in the "computing and data" infrastructure, skills and supporting mechanisms that underpins modern AI.

If these priorities are executed effectively, the EU can align ethical values with industrial prowess to consolidate its position as the global leader in Trustworthy AI.

Strategic Priorities for Europe on Trustworthy AI:

- Mobilise capital at scale to close the late-stage funding gap and enable the growth of competitive made-in-Europe AI companies.
- Ensure regulatory coherence and consistency and establish mechanisms that prevent regulation from becoming an innovation barrier, especially for SMEs.
- Invest in sovereign infrastructure, including high-performance computing and interoperable, unified data spaces
- Support innovation schemes that ensure fair and efficient use and access to shared AI resources, HPC and data spaces.
- Deliver a clear, deliberate message promoting a value-based AI business mindset, where trust offers competitive advantage.
- Leverage cultural and linguistic diversity as a unique asset in AI model design.
- Strengthen international partnerships with like-minded global actors (e.g., Japan, Canada, UK, Australia and the Global South) to advance shared standards, research and innovation.
- Retain and attract AI talent through targeted research and innovation funding and competitive incentives for companies and individuals.

I.

INTRODUCTION

This report starts with providing a market analysis of the most important forecasts of growth of the AI market in the EU. A high-level description of the main reasons why trustworthy AI is a needed feature for all future AI deployments, touching also on the main European actors and current issues, is provided, together with some preliminary consideration on the European legislation and a comparison against other areas of the world. It is important to note that while this analysis touches upon digital automation, its primary focus is on software and algorithmic AI.

This report then proceeds by examining three dimensions: the drivers of growth, the barriers to wider adoption, and the actors shaping market dynamics. Growth is encouraged by corporate expenditure, public-sector programs, and regulation-driven demand for governance solutions. Barriers include shortages of qualified personnel, fragmented data infrastructures, regulatory complexity, and linguistic diversity across Member States. Emerging developments, such as governance frameworks, sector-specific AI applications, and multilingual European foundation models, illustrate how these pressures are being addressed.

A mapping of key actors highlights the role of different communities describes how large multinational firms continue to dominate infrastructure and cloud services. At the same time, European enterprises and startups specialising in bias detection, transparency, and compliance are becoming more visible. Academic institutions, research centres, and standardisation bodies provide the frameworks within which these technologies are evaluated and deployed. In this line, investment patterns are another critical element. Public-sector initiatives and VC flows indicate sustained interest, but difficulties remain in late-stage funding for European startups. This limits the capacity of firms to scale operations. When compared with the U.S. or China, European investment appears much smaller and less prone to risks, which raises questions about long-term competitiveness.

Moreover, the AI Act imposes tiered obligations, particularly for high-risk systems, including requirements for transparency, human oversight, and bias prevention. While this framework is intended to foster trust, it may also introduce compliance burdens and affect innovation dynamics. The section Market Dynamics Under the AI Act examines these possible impacts on business models and competitive strategies.

Adoption of AI is uneven across sectors. In transportation, logistics, healthcare and finance, high levels of scrutiny are required because of the potential consequences of algorithmic decisions. In manufacturing, energy, and industrial automation, the emphasis lies on efficiency and optimisation, with lighter regulatory pressure. Sectoral variations highlight the differentiated impact of European regulation.

A Strengths, Weaknesses, Opportunities and Threads (SWOT) analysis is provided to assess the position of the EU. Regulatory leadership is a strength, but limited scalability, funding disparities, and institutional fragmentation are weaknesses. Opportunities are present in transparency mechanisms, privacy-preserving technologies, and sustainability-oriented approaches. Threats include talent migration, intensified competition from other regions, and the internal complexity of the European regulatory landscape.

The concluding section synthesises these findings. The European approach combines innovation and regulation, seeking to balance investment priorities with legal and ethical standards. The long-term trajectory will depend on whether this balance creates both confidence in adoption and the capacity to remain competitive globally.

II.

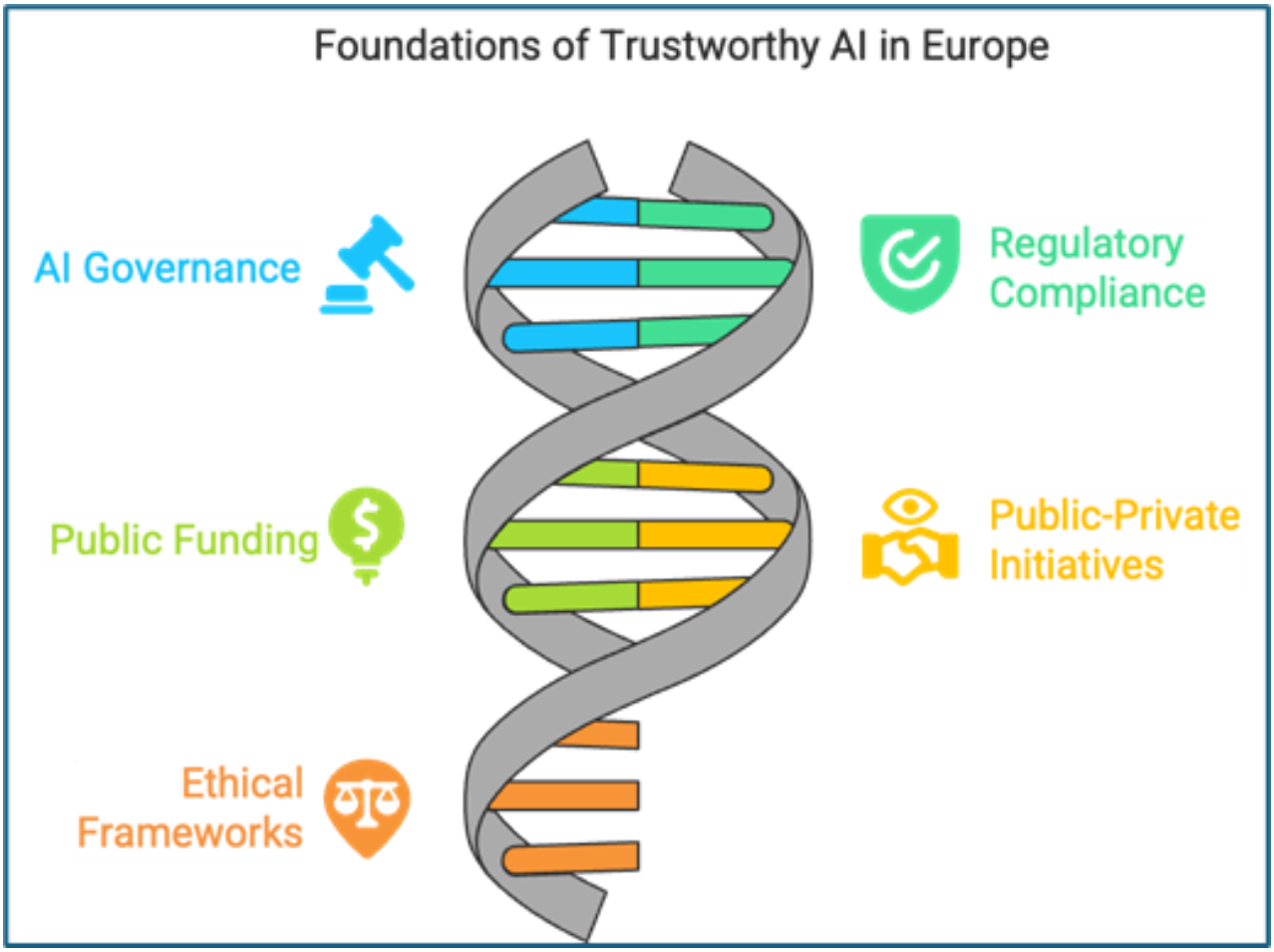
CURRENT MARKET SIZE AND THE AI ECOSYSTEM IN THE EU

The European AI market is expanding at a striking pace, though the exact figures depend on whom you ask. In 2024, one estimate placed its value at approximately €26.3 billion [1]. Some projections are more aggressive, suggesting it could climb to €186 billion by 2033, implying an annual growth rate of roughly 24%. Others are even more bullish, expecting the sector to hit €61 billion as early as 2030, with growth rates closer to 33%.

Put simply, most forecasts land somewhere between 25% and 35% yearly growth, a hefty increase by any standard. Several forces appear to be driving this trend: steady public investment, industrial demand for digital transformation, and a political climate that heavily favours digitalisation. This push is not new. The AI initiative of European Commission (EC) in 2017 already framed AI as a chance to capitalise on the EU's scientific base, industrial strengths, and growing startup scene. More recently, the Digital Decade Strategy has raised the bar further, aiming to ensure that by 2030 at least three-quarters of European businesses adopt AI and cloud technologies. If these ambitions hold, the European AI market may well pass the €190 billion mark before the decade is out [2].

Growth that will likely be boosted not only by the EU's target of €20 billion in yearly AI investment but also by the spread of large-scale AI models and automation solutions. However, the EU is not alone in this race. Countries like the UK and Canada are also pushing hard, but the EU has carved out a specific niche for itself by stressing "trustworthy AI". This focus on ethics, transparency, and safety has become a calling card in sectors where public trust is fragile, ranging from healthcare to public administration.

The EU's position is hardly unchallenged. Skills shortages remain a chronic problem, data resources are frequently fragmented across borders, and funding still lags what the U.S. or China can mobilise. One could argue that the EU's emphasis on regulation is both its strength and its Achilles' heel: it helps build confidence but risks slowing down deployment. As controversies around AI ethics continue to flare up, "trustworthy AI" has shifted from being a lofty principle to something closer to a survival requirement, especially if AI systems are to be integrated into the most sensitive parts of daily life.



Although trustworthy AI is often treated as an umbrella concept cutting across industries, there is now a distinct sub-market emerging around governance and risk management. Companies and regulators alike are pushing for tools that can spot bias, improve explainability, and ensure AI systems comply with fast-evolving rules. What might have seemed like a niche concern a few years ago has effectively become central to the EU's AI strategy. Dedicated public funding and joint public–private efforts have made regulatory-oriented frameworks not just an add-on, but a focal point of how AI is expected to develop in the region.

Crucially, this ecosystem relies on more than just the AI Act. "Data" serves as the foundational bedrock for effective and trustworthy AI. While the General Data Protection Regulation (GDPR) set the stage for privacy, newer legislative frameworks such as the Data Act and Data Governance Act are equally pivotal. These acts aim to unlock the reuse of industrial data and create a harmonised market for data sharing, directly addressing the "data poor" fragmentation that has historically hampered European innovation. Initiatives like the **European Data Spaces** are designed to operationalise this, ensuring that the high-quality, interoperable data required for robust AI models is available across Member States.

The EU AI Act and, in parallel, the creation of regulatory sandboxes stands out as turning points. They do not just sketch principles; they ground them institutionally, giving Member States a structured way to test and apply Trustworthy AI in practice. Money is flowing, too: Brussels has spoken of €20 billion for AI "gigafactories" and a far larger €200 billion pool via InvestEU, parts of which are earmarked for responsible AI. Some observers might note that these figures, while impressive on paper, risk being spread thinly across priorities; still, they reflect a serious commitment to keeping the EU in the game. These financial signals are being matched by technical and ethical frameworks developed outside the formal legislative sphere. Initiatives such as BDVA's etami, Confiance.ai, or Z-Inspection®, among others, are actively shaping what "trustworthy" looks like when translated into sector-specific tools and day-to-day practices. Taken together, they suggest the EU is not only regulating AI from the top down but also nurturing a parallel ecosystem of standards and methodologies from the bottom up. Whether this dual approach will prove agile enough to keep pace with global competition, however, remains an open question.

Furthermore, the market for AI governance and risk management solutions was valued at approximately $2.1 billion globally in 2023 [3]. The EU represents a notable share of this figure, largely because companies are preparing for the regulatory obligations of the EU AI Act. At the same time, the EU's AI sector accounts for only 15–17% of global activity [4], [5]. This indicates a visible presence but not a dominant one in the international context.

Independent data on the growth of trustworthy AI as a specific domain are not available. Its trajectory appears closely connected to that of the broader AI sector. However, the volume of public investment, combined with the regulatory requirements established by the AI Act, suggests that activity in this area is expanding at a pace roughly comparable to overall AI markets, though precise measurement remains difficult. Trustworthy AI is not confined to a single set of technologies but cuts across different initiatives, e.g., those supported through public or institutional funding. In this sense, the development of governance and compliance tools may be seen as one of the most rapidly institutionalised areas of AI in the EU.

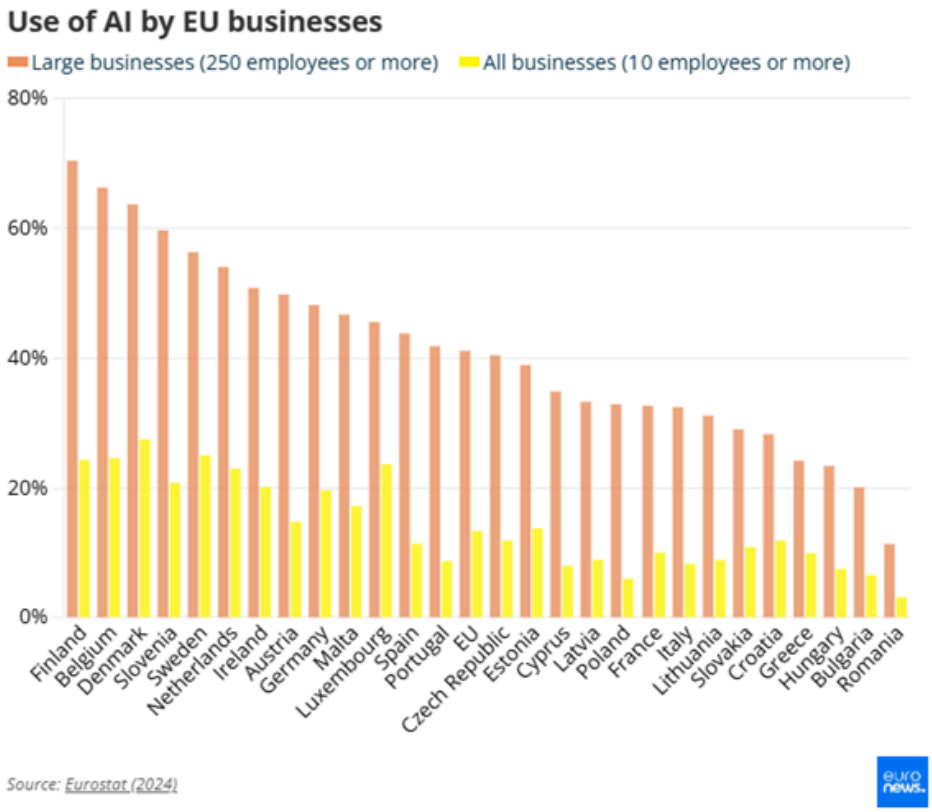
European strategy positions trustworthiness as a source of competitive differentiation. The introduction of the AI Act is expected to reinforce this approach by setting legally binding standards for fairness, accountability, and reliability. This strategy rests on the assumption that compliance can serve not only as a legal requirement but also as a market advantage. Yet this outcome is uncertain. Regulation can support adoption by increasing confidence, but it also generates costs and may slow experimentation in certain domains.

III.

GROWTH TRENDS: DRIVERS, BARRIERS & EMERGING THEMES

Artificial intelligence adoption across Europe has accelerated significantly in recent years. In 2023, more than one in three European businesses reported utilising AI, a sharp increase closely linked to the diffusion of generative systems like ChatGPT, which drastically lowered entry barriers for many firms [6]. Eurostat data confirms this upward trajectory: among EU enterprises with ten or more employees, adoption rates jumped from 8.0% in 2023 to 13.5% in 2024 [7]. This rapid rise within a single year suggests that AI experimentation is no longer the domain of a narrow group of early adopters but is spreading under the combined pressure of competitive dynamics and the availability of off-the-shelf tools.

However, adoption patterns are far from uniform. Large enterprises in Finland, for instance, report adoption levels around 70%, nearly six times the European average. By contrast, major economies such as France and Italy record rates closer to one-third among distinct large firms. This disparity indicates that company size alone does not dictate uptake; national contexts and digital maturity still heavily shape these trajectories.



Source: Eurostat. Proportion of enterprises using AI technologies in EU countries, 2023 vs 2024. The EU average (far left) rose from 8% to 13.5% in one year, with leading countries like Denmark, Sweden, Belgium now above 25% adoption.

Several factors are propelling the development of trustworthy AI, but three of them stand out: the regulatory and trust agenda promoted by EU policymakers; public funding initiatives directed toward research and startups; and the growing demand from industry and consumers for reliable applications.

The regulatory push is arguably the most central driver. The AI Act and related initiatives compel companies to design systems that are transparent, safe, and aligned with ethical standards. The expectation is that regulatory clarity will reduce uncertainty for developers while increasing public confidence. Simultaneously, a growing awareness of risks (bias, opacity, and accountability gaps) has generated a robust market demand for technical solutions that make AI explainable and auditable [9], [10]. Many organisations now view bias mitigation and compliance not merely as legal boxes to check, but as competitive features that distinguish them in a crowded market.

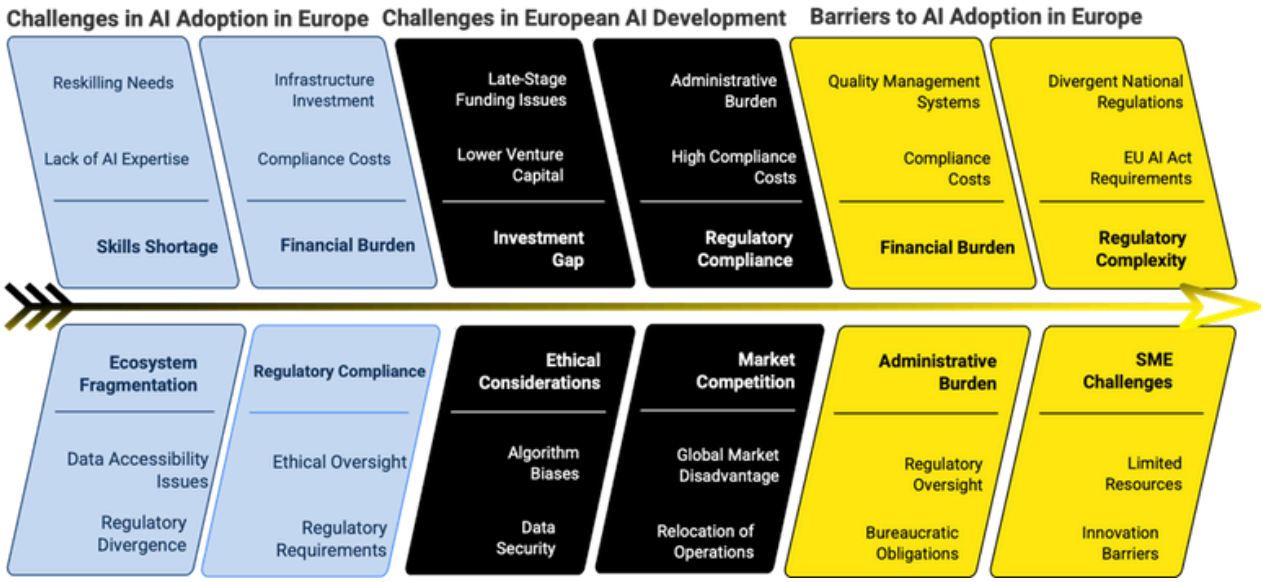
Funding represents the second major driver. European governments and the EU are channelling significant resources through programs such as Digital Europe and Horizon Europe, which together allocate approximately €2 billion annually to AI [11], [12]. The EC has set an ambitious target of mobilising €20 billion per year in AI funding by the end of the decade. Early 2024 also saw the launch of the AI Innovation Package, designed to support startups and SMEs specifically focused on trustworthy AI [13]. Complementing this, the GenAI4EU initiative specifically targets the development of generative AI "made in Europe," ensuring these powerful models align with EU values and industrial needs [8]. This package includes a strategic investment framework intended to leverage the EU's unique assets, such as its world-class supercomputing capacity, to foster an ecosystem capable of sustaining the entire lifecycle of research, development, and deployment [14].

The third factor is market pull. Enterprises across all sectors are adopting AI to drive efficiency, while users increasingly expect AI-driven services to be reliable and safe by default. The Digital Decade targets aim for 75% of European firms to integrate cloud and AI technologies by 2030 [15], effectively embedding trust requirements within a broader digitalisation agenda. The explosion of generative AI in 2022–2023 exposed a vast public audience to AI capabilities, prompting widespread experimentation. This has placed immense pressure on slower-moving firms to catch up. In domains such as manufacturing and healthcare, established applications like predictive maintenance and AI-supported diagnostics now serve as proof points: companies are far more willing to invest when they see evidence that these tools function reliably in safety-critical environments.

3.1 Barriers and Challenges

[Skills and Expertise gaps | Fragmentation and Data Barriers | Costs and Complexity of Compliance | Investment gaps]

Despite this progress, a specific set of challenges continues to limit the scalability and competitiveness of the European AI market. These issues point toward the urgent need for targeted workforce development, simplified compliance processes, and, crucially, a more unified approach to data infrastructure.



A primary obstacle is the **fragmentation of the European data ecosystem**. The EU constitutes a massive potential market, yet linguistic diversity and differing legal interpretations frequently complicate the cross-border deployment of AI systems. Access to high-quality, large-scale datasets, essential for training robust machine learning models is often stifled by data silos, intellectual property concerns, and uneven privacy protections. SMEs are disproportionately disadvantaged by this, as they lack the resources to aggregate data across borders.

This is where the "data" dimension of the European strategy becomes critical. The lack of interoperability is a known bottleneck, which initiatives like the Data Act and Data Governance Act aim to resolve by creating a single market for data. Technical enablers are equally important; the deployment of Common European Data Spaces and the SIMPL middleware is intended to provide the secure, federated infrastructure necessary for data to flow freely yet securely between industries and Member States. Without these mechanisms, firms in digitally advanced regions will continue to enjoy competitive advantages, while others face structural barriers to scaling their solutions.

A second major challenge is the **shortage of skilled professionals**. Many European organisations currently lack the workforce capacity to design and implement advanced systems, particularly those requiring the rigorous ethical oversight mandated by trustworthy AI frameworks. A 2024 survey of EU financial firms found that 78% of managers reported deficiencies in their teams' ability to integrate generative AI [17, 18]. Executives estimate that nearly 40% of the workforce will require reskilling within three years. Without sufficient expertise, organisations struggle to embed safety, explainability, and risk management into their workflows [19, 20]. While the European Skills Agenda and Pact for Skills are mobilising stakeholders to address this, the talent gap remains a significant constraint.

Compliance costs represent another hurdle. The emphasis on trustworthy AI imposes financial and administrative burdens that can be heavy for smaller players. Estimates suggest that developing a single high-risk AI system under the AI Act may incur €6,000–€7,000 in compliance preparation costs, plus an additional €3,500–€7,500 for external conformity assessment [21]. These figures do not include the setup of full Quality Management Systems, which can cost hundreds of thousands of euros [22], [23]. While the Act includes provisions to simplify requirements for SMEs, the cumulative weight of these obligations' risks deterring smaller firms from entering high-risk domains.

The investment gap persists. While capital flows into European AI have increased, they remain considerably lower than levels observed in the U.S. and China. Venture capital in those regions is more readily available, particularly for late-stage growth. European startups frequently struggle to secure such funding, leading many to relocate to markets with deeper financial ecosystems [24], [25]. This shortage of risk capital hampers the scaling of promising ventures and weakens Europe's ability to compete globally. Policy responses like the European Innovation Council (EIC) and InvestEU are attempting to close this gap, but the disparity remains a structural weakness.

The **alignment between technological development with normative and ethical expectations remains challenging**, involving algorithmic bias, safeguarding privacy and data security, and ensuring that decision-making processes remain transparent and accountable. That is especially relevant considering that several regulations need to be handled at the same time when a product must be launched into the European market - AI Act, Data Act, Cybersecurity Act, Cyber Resilience Act (CRA), etc. - and a clear split of competencies and alignment among regulations is still missing.

If these issues are not managed effectively, public trust in AI may decrease, reducing willingness to adopt such technologies even in cases where they provide demonstrable benefits.

3.2 Emerging Trends

[AI Governance and ethics as norms | Generative AI and Foundation Models | Sectoral guidelines and standards | Collaborative research and policy ecosystem]

Several trends are reshaping the landscape, reflecting how the market is adapting to these pressures.

A first trend is the institutionalisation of AI governance and ethics as an integral business function. Ethical reviews, fairness audits, and bias detection are no longer peripheral activities but standard business functions. The demand for auditing tools and explainability mechanisms is creating a distinct niche for AI assurance services. Firms that can demonstrate strong safeguards are gaining reputational benefits, positioning transparency and fairness as competitive differentiators [26].

A second development concerns generative AI and large foundation models. These technologies are driving infrastructure investments. European actors are positioning themselves to develop foundation models that are "secure by design," aligning with European values and legal frameworks. This has stimulated investment in computing infrastructure and cloud-based training facilities, acknowledging that competitive AI development requires control over the underlying compute resources.

A third trend is the emergence of sector-specific rules and guidelines. For instance, in healthcare, medical device regulations now explicitly address AI-driven diagnostics. In finance, the European Banking Authority has introduced guidance on AI credit scoring. These frameworks are shaping product design by embedding explainability and human oversight directly into the development lifecycle. Parallel efforts by standardisation bodies like CEN-CENELEC and ISO/IEC are advancing the technical norms that will underpin conformity assessments under the AI Act, having the charter to create European harmonised specifications, making them an operational necessity for firms seeking certification that allow them to launch products in the European market.

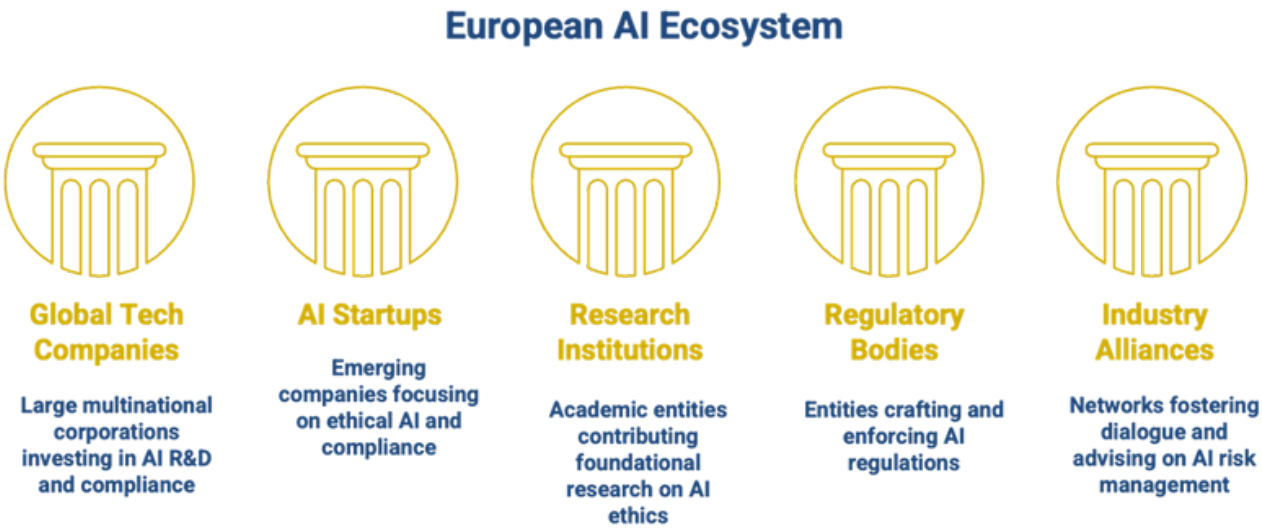
A fourth element is the strengthening of collaborations across academia, industry, and policymaking. AI governance is inherently interdisciplinary, and Europe hosts several of the world's top research hubs for AI ethics [29], [30]. Networks such as etami (within BDVA) and AI4People facilitate knowledge exchange between computer scientists, legal experts, and ethicists, ensuring that technical development is grounded in societal impact research [27], [28].

The balance between economic objectives and normative commitments will determine the position of the EU in the global AI economy. Trustworthy AI is emerging not only as a regulatory category but as a defining dimension of EU's strategy to integrate AI into society while safeguarding fundamental rights.

IV.

KEY PLAYERS SHAPING THE MARKET

[Tech Companies (Providers & Deployers) | AI Startups and Scale-ups | SMEs I Research Institutions and Consortia | Regulatory and Standards Bodies | Industry Alliances and Advocacy Groups]



The European trustworthy AI landscape is defined by the interaction of corporate actors, research institutions, regulatory bodies, and industry alliances. Each group plays a distinct role, yet their actions are increasingly interconnected, leading to a convergence around governance and compliance-driven innovation.

Corporate actors remain central. Multinational technology giants—including Microsoft, Google, and DeepMind—have invested heavily in AI research and infrastructure within the EU. Their dominance in cloud services and machine learning platforms means their willingness to integrate trustworthy AI requirements will largely shape industry norms. Alongside them, European enterprises like Siemens and SAP are embedding compliance into industrial automation and enterprise software, framing trustworthiness not as a constraint, but as a value proposition for safety-critical industries.

The **startup ecosystem** adds a layer of agility. A new wave of European and transatlantic startups is specialising in transparency, auditing, and compliance. Companies like Helsing (defence), DeepL (language), and Aleph Alpha (foundation models) are developing technologies designed to reflect European privacy and ethical standards. While some of these firms have raised significant funding, their growth journeys often highlight the structural challenge of late-stage venture capital availability in Europe [31], [32]. If the AI Act succeeds in making the EU a hub for compliance-oriented AI, these firms stand to leverage certification as a major competitive advantage.

The **academic and research** sector provides the intellectual backbone. National centres and academia are contributing fundamental advances in fairness, interpretability, and accountability. Their research influences both EU policymaking and corporate governance practices. In addition, many AI startups are spin out of these, specialised in explainability or auditing, underlining the link between scientific innovation and commercial development.

Regulatory and standards bodies form another layer of governance. The EC, particularly through DG CNECT and DG GROW, has been central in shaping the AI Act. The European Parliament and Council have refined the legislation, while national authorities will oversee implementation, coordinated through the European AI Board. Other agencies, including the European Data Protection Supervisor (EDPS), the European Medicines Agency (EMA), and the European Banking Authority (EBA), have issued sectoral guidance on privacy, healthcare, and financial services. In parallel, standardisation bodies such as ETSI, CEN-CENELEC and ISO/IEC JTC 1/SC 42 are drafting technical standards for risk management and auditing. These frameworks are expected to guide conformity assessments under the AI Act and create harmonised standards that all products to be sold in a European market will have to be compliant with.

Finally, **industry alliances** facilitate the necessary dialogue between the private sector and policymakers. The European AI Alliance and organisations like Digital Europe provide platforms for stakeholder exchange. Initiatives such as the AI Pact and BDVA's etami offer spaces for operationalising trustworthy AI through voluntary pledges and collaborative frameworks [34]. These interactions illustrate Europe's ambition to lead in trustworthy AI, even as it navigates the tension between regulatory rigor and the need for global competitiveness.

V.

INVESTMENT TRENDS IN TRUSTWORTHY AI

[Venture Capital and Corporate Investment | Government funding and grants | corporate spending on AI | Momentum in specific segments]

Investment in artificial intelligence within Europe has expanded considerably in recent years, yet the region still trails behind global leaders. In 2023, venture capital (VC) investment in EU-based AI startups amounted to roughly $8 billion. While substantial in absolute terms, this figure pales in comparison to the $68 billion directed toward U.S. firms and is roughly half of the ~$15 billion raised by Chinese companies [35]. This disparity reflects a structural challenge for the European AI ecosystem: while the region possesses a robust base of technological expertise, domestic late-stage funding remains scarce.

Consequently, many startups turn to U.S. investors or relocate abroad to scale their operations. An analysis of 147 European AI startups that reached unicorn status in the past decade reveals that 40 moved their headquarters, most often to the United States, in search of more favourable financial conditions [36], [37]. This trend underscores the critical need to strengthen Europe's domestic investment ecosystem to support firms across the full innovation cycle, from early-stage development to commercialisation.

European investment patterns combine support for emergent technologies with a focus on governance, safety, and regulatory compliance. Although Europe remains behind in overall funding volume, recent developments indicate gradual progress. New EU funding instruments, record VC rounds for select firms, and the rise of investors specialised in ethical AI suggest that the gap is narrowing. However, the sustainability of the trustworthy AI market will depend on whether financial ecosystems can provide sufficient resources for scaling without pushing firms to relocate.

Private and public funding trends illustrate both volatility and resilience. VC and corporate investment peaked in 2021 but contracted in 2022–2023 due to global macroeconomic uncertainty. By 2024, investment activity had recovered, with notable growth in generative AI, compliance solutions, and AI-driven cybersecurity. Venture capital firms and corporate investors are increasingly directing resources toward AI governance and risk management, reflecting the anticipated demand created by the AI Act. Startups developing auditing tools, explainability frameworks, and privacy-preserving approaches have attracted particular attention.

Geographically, several European cities have consolidated their roles as investment hubs. London-based AI startups, for instance, raised $3.5 billion in 2024, a 52% increase from the previous year [38]. Corporate actors such as Siemens, Bosch, and Total are also expanding investments, often through acquisitions and partnerships designed to embed automation and safety guarantees into their product lines.

Public-sector funding plays a critical role in de-risking innovation. Horizon Europe allocates around €1 billion annually to AI research and development between 2021 and 2027 [39], while the Digital Europe Programme adds another €1 billion each year for test beds, data-sharing initiatives, and capacity building. Projects such as the Networks of Excellence on AI (NoEs) exemplify investments specifically targeted at trustworthy AI. National governments complement EU-level support: France has pledged €1.5 billion for AI, and Germany €3 billion through 2025, with a focus on ethical and regulatory-compliant solutions. Furthermore, in 2024, the European Innovation Council (EIC) launched dedicated calls for startups working on validation, risk assessment, and compliance.

Corporate expenditure on AI is also rising across sectors, with a notable share allocated to governance and compliance. In banking, AI-related spending is projected to increase from $7.2 billion in 2024 to significantly higher levels by 2028, with investments focused on automation, fraud detection, and risk management in line with transparency requirements. A 2024 survey of European financial executives reported that 72% plan to expand generative AI capabilities within three years [40]. Similar patterns appear in healthcare and manufacturing, where pilot projects are being scaled up. Firms are explicitly allocating resources to compliance teams, documentation processes, and third-party audits in anticipation of the AI Act, creating a nascent compliance services market.

Within the wider investment landscape, specialised segments are emerging. Cybersecurity and risk management solutions are gaining prominence as investors recognise the need to secure AI systems against adversarial threats. The global market for AI TRiSM (Trust, Risk, and Security Management) is undergoing rapid expansion, driven by rising concerns over ethical AI, regulatory compliance, and secure machine learning deployment. Valued at USD 2.34 billion in 2024, the market is projected to reach USD 7.44 billion by 2030, growing at a CAGR of 21.6% [41]

The AI governance market is another fast-growing segment, valued at approximately USD 890.6 million in 2024 and forecasted to reach around USD 5.78 billion by 2029 [91], with some projections reaching USD 4.3 billion by 2033 (IMARC Group). CAGRs range from 36.7% to 45.3% [91]. European startups such as Mirai Security (Spain) and Dust Identity (France) illustrate this shift, offering safety and integrity-focused solutions.

Regulatory technology (RegTech) for AI is another growing segment, with companies developing automated compliance documentation, model registries, and auditing services. The AI Act has accelerated interest in RegTech, as firms seek to integrate compliance into operations efficiently. Sector-specific solutions are also attracting investment; in healthcare, certified AI-driven medical devices require rigorous validation, while in energy, AI tools for grid optimisation must meet strict safety standards. These niches align with Europe's comparative advantage in highly regulated industries, where demand for validated and compliant AI solutions is strongest.

VI.

MARKET DYNAMICS UNDER THE AI ACT (IMPACT ON BUSINESS MODELS AND INNOVATION)

Adopted in 2024, the EU AI Act will guide how AI systems are built and implemented in the EU, with the goal of boosting customer trust and adoption. It defines a risk-based framework in which obligations are proportional to the potential harm associated with a given system. This regulation is influencing market dynamics in several ways. On one side, it positions compliance as a core element of business planning, therefore affecting product strategies and business models and stimulating demand for trustworthy solutions. On the other side, while the regulation is designed to reinforce trust and accountability, it introduces additional costs that may alter competitiveness and raise questions about possible effects on innovation trajectories, investment flows, and the global competitiveness of European firms.

The AI Act can therefore be seen as both a constraint and an enabler. In the short term, firms are experiencing higher costs and organisational adjustments. Over the longer term, however, standardisation, increased consumer confidence, and compliance-driven innovation may contribute to the creation of a more stable and scalable AI ecosystem. The extent of the Act's impact will depend on the effectiveness of its implementation and the EU's capacity to sustain a balance between regulatory rigor and innovation. In addition, there is a point to consider: a global market where other regions may adopt more flexible approaches.

6.1 Compliance as a Core Business Consideration

The compliance landscape under the AI Act is set to become a central element of business strategy for providers operating in the EU. The regulation introduces a tiered approach, classifying systems by risk. Applications considered high risk, including recruitment, credit scoring, medical diagnostics, and public infrastructure, are subject to the most demanding requirements. Providers in these categories must establish risk management frameworks, prepare technical documentation, implement governance measures to reduce bias, and ensure human oversight prior to deployment [42,43]. In many cases, third-party conformity assessments will also be required, adding further regulatory checks.

In practice, this framework makes compliance an unavoidable cost of operating in the European market. Firms are beginning to review their portfolios to determine which products fall into high-risk categories and, where possible, to explore redesign or reclassification to reduce obligations.

According to the EC's impact assessment, baseline compliance costs for a single high-risk AI system are estimated at €6,000–7,000, with an additional €3,500–7,500 for third-party conformity assessments. These figures exclude the costs of ongoing organisational adaptation. Many providers are expected to implement full Quality Management Systems (QMS) to maintain compliance, with estimated setup expenditures ranging from €190,000 to €330,000 [44,45]. Such requirements highlight the uneven impact of the Act across firms of different sizes and capacities.

Compliance Item	Estimated Cost
Implementing required controls (internal) for one high-risk AI system (documentation, risk management,	€6,000–€7,000 [46]
Third-party conformity assessment (one-time certification audit)	€3,500–€7,500 [47]
Setting up Quality Management System (incl. auditing processes, possibly needed for continuous	*€190k–€330k* (one-time investment) [48]

Table: Estimated compliance costs per high-risk AI system as per EU Impact Assessment. Small providers may face lower fees if some requirements are waived, but the quality system overhead can be substantial.

Larger companies are building dedicated compliance teams or engaging external consultants to address the technical and legal dimensions of the Act. Indeed, larger firms are better positioned to absorb the costs associated with compliance, and some may even convert these requirements into a competitive advantage by signalling higher standards of trustworthiness. However, for SMEs, startups, and smaller developers, the financial burden can be prohibitive, discouraging entry or slowing innovation in high-risk domains.

At the same time, the regulatory environment is giving rise to a distinct compliance ecosystem. Consulting firms, audit providers, and developers of compliance automation tools are increasingly offering services to help organisations meet these obligations, effectively creating a new market for "compliance as a service."

6.2 Impact on Business Models and Product Strategy

The AI Act is reshaping how companies develop and deploy AI, prompting shifts in business models and product strategies. One immediate response has been the reconfiguration of AI offerings to avoid classification as high-risk. For instance, a company providing AI-based CV screening tools, considered high risk in employment contexts, may alter its product by requiring human oversight in final hiring decisions, thereby reducing regulatory obligations. Other firms have explored geo-restricting functionalities, offering compliance-heavy models within the EU while deploying less restricted versions in other regions. This mirrors the response of some U.S. media outlets following the introduction of the GDPR, when compliance challenges led them to block European access altogether.

Can stringent requirements slow innovation? In 2024, an open letter signed by AI executives warned that heavy compliance burdens could discourage investment and drive leading researchers abroad [52,53]. Others see the Act as a catalyst for new market opportunities. By mandating transparency, explainability, and risk mitigation, it has created demand for AI assurance technologies. Firms specialising in bias reduction, privacy-preserving AI, and continuous monitoring are expected to benefit. For example, Accenture introduced an explainable AI service in 2024 to support compliance with EU rules while promoting algorithmic transparency [54,55]. Similarly, requirements for ongoing model oversight are stimulating interest in lifecycle management and auditing software, positioning compliance-oriented providers to gain a competitive edge.

6.3 Costs and Competitiveness

Compliance costs remain a central concern, but their long-term impact on competitiveness is debated. Executives from Siemens, Airbus, and SAP have argued that inflexible compliance obligations may raise costs, reduce risk-taking, and contribute to talent migration [50,51]. However, large corporations with greater financial capacity may transform compliance into a differentiating factor, marketing their solutions as certified transparent and reliable. Such dynamics could accelerate market consolidation, with smaller firms struggling to meet costs while larger players dominate high-risk domains.

The Act is also expected to generate demand for AI liability insurance. Complemented by the proposed AI Liability Directive, it establishes stricter accountability rules for developers. Non-compliant firms could face penalties or lawsuits, prompting investment in risk assessments and formal coverage. For U.S. and Chinese providers operating in the EU, compliance will be obligatory, though many have resources to absorb associated costs. Nevertheless, if implementation proves too demanding or ambiguous, some providers may reconsider their engagement in the European market, reducing the variety of AI offerings available to consumers.

6.4 Positive Market Stimulation

Despite concerns about compliance burdens, the AI Act may also stimulate adoption by embedding trust and inclusivity into AI use. Policymakers argue that clear, enforceable rules provide standardised approaches to risk management, reducing uncertainty and encouraging broader uptake [57], [58]. Transparency provisions, including requirements for labeling AI-generated content, ensuring chatbots disclose their automated nature, and mandating explainable decisions in high-risk contexts, may help alleviate public scepticism. Surveys suggest that Europeans remain cautious about AI, often citing opacity and bias as key concerns [59]. By addressing these issues, the AI Act has the potential to foster greater acceptance and support more sustainable forms of AI deployment across sensitive sectors.

VII.

SECTOR-SPECIFIC IMPLICATIONS

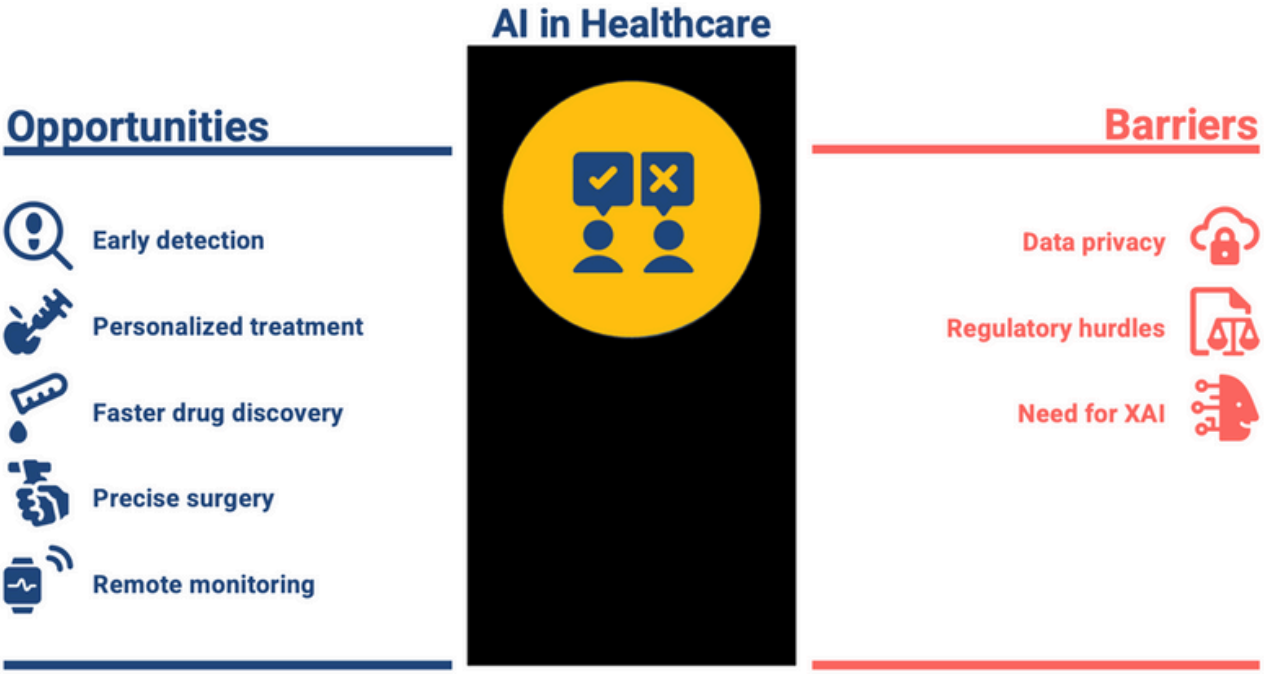
[Healthcare and Life Sciences | Finance and Banking | Manufacturing and Automation | Public Sector and Security | Retail and Consumer Services | Energy and Infrastructure]

The implementation of the AI Act will have wide-ranging effects across various sectors of the European economy. Each industry faces distinct levels of scrutiny: high-risk applications must comply with strict requirements, while low-risk applications are subject to lighter transparency obligations. As adoption expands, firms will need to align their AI strategies with sector-specific trustworthiness principles to remain compliant, retain consumer confidence, and sustain innovation. This section examines key sectors, focusing on regulatory obligations, market adaptations, and emerging opportunities versus barriers.

7.1 Healthcare and Life Sciences

Healthcare and life sciences could benefit substantially from AI in diagnostics, drug discovery, and patient care. At the same time, these areas are subject to some of the strictest provisions of the AI Act. Diagnostic imaging tools, patient risk prediction systems, and robotic surgery are classified as high risk, since they directly affect health outcomes [60]. Compliance requires adherence not only to the AI Act but also to the EU Medical Device Regulation (MDR). Developers must therefore demonstrate rigorous clinical validation, provide transparency to patients and clinicians, and maintain post-market monitoring.

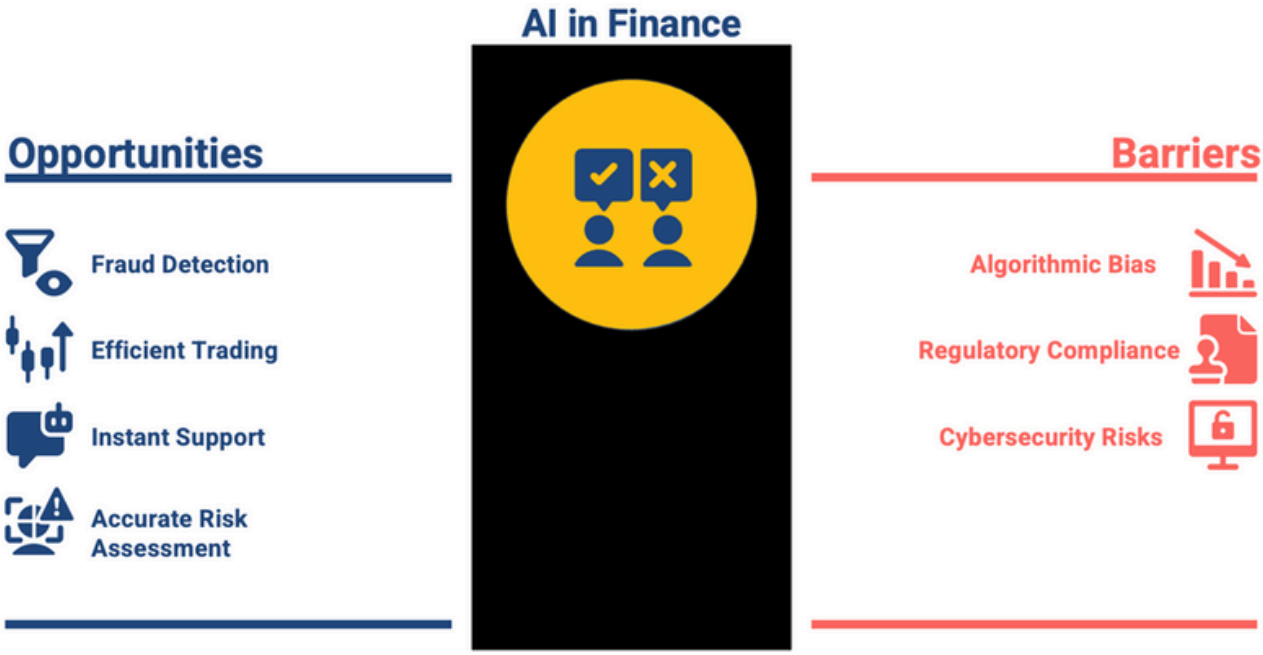
While these obligations raise costs, they may also increase trust. Certified medical AI tools are more likely to be adopted by hospitals, insurers, and regulators. Data protection requirements under the GDPR continue to apply, particularly for sensitive patient data, and are encouraging the uptake of privacy-preserving methods such as federated learning. Increasing interest in generative AI tools, from transcription assistants to medical image analysis models for diagnosis, requires adequate mechanisms to protect sensitive data and to detect and mitigate model drifting. The market for AI in healthcare is expanding rapidly, valued at $4.3 billion in 2023 with an annual growth rate of 37% [61]. Early certification may offer European firms a competitive edge in global markets.



7.2 Finance and Banking

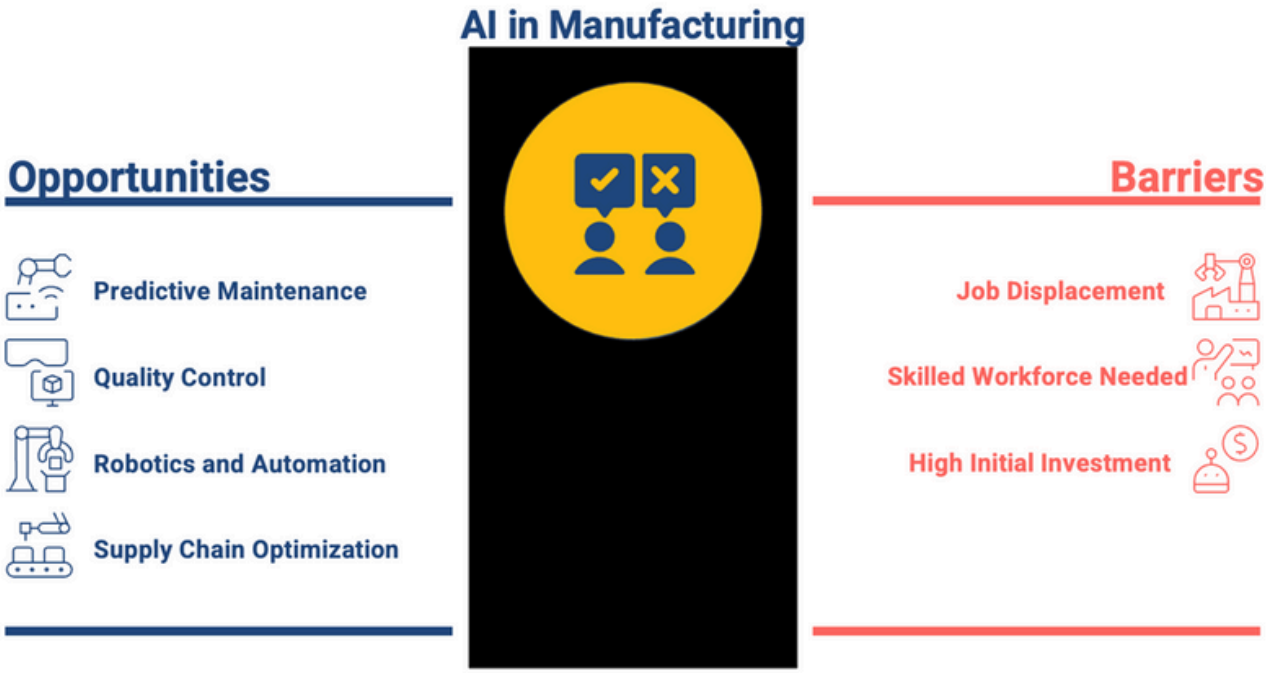
Financial services are already tightly regulated and highly sensitive to the AI Act. Applications such as credit scoring, fraud detection, risk management, and trading are widespread, but credit risk assessments and loan approvals fall under the high-risk category, requiring fairness, transparency, and auditability.

European banks are introducing governance frameworks and, in some cases, AI ethics boards to oversee decision-making. Nonetheless, readiness is uneven: in late 2024, only 11% of financial firms reported full preparedness, despite expectations that 83% of institutions will adopt AI by 2028 [62,63]. This gap is generating opportunities for compliance solutions and services, including third-party validation and specialised roles such as AI risk officers. Fintech firms that can demonstrate fairness and explainability are likely to be more competitive. Regulators, notably the EBA and the European Central Bank (ECB), are playing active roles in monitoring compliance. RegTech solutions, AI tools designed to facilitate regulatory obligations, illustrate how compliance itself is becoming a market driver.



7.3 Manufacturing and Automation

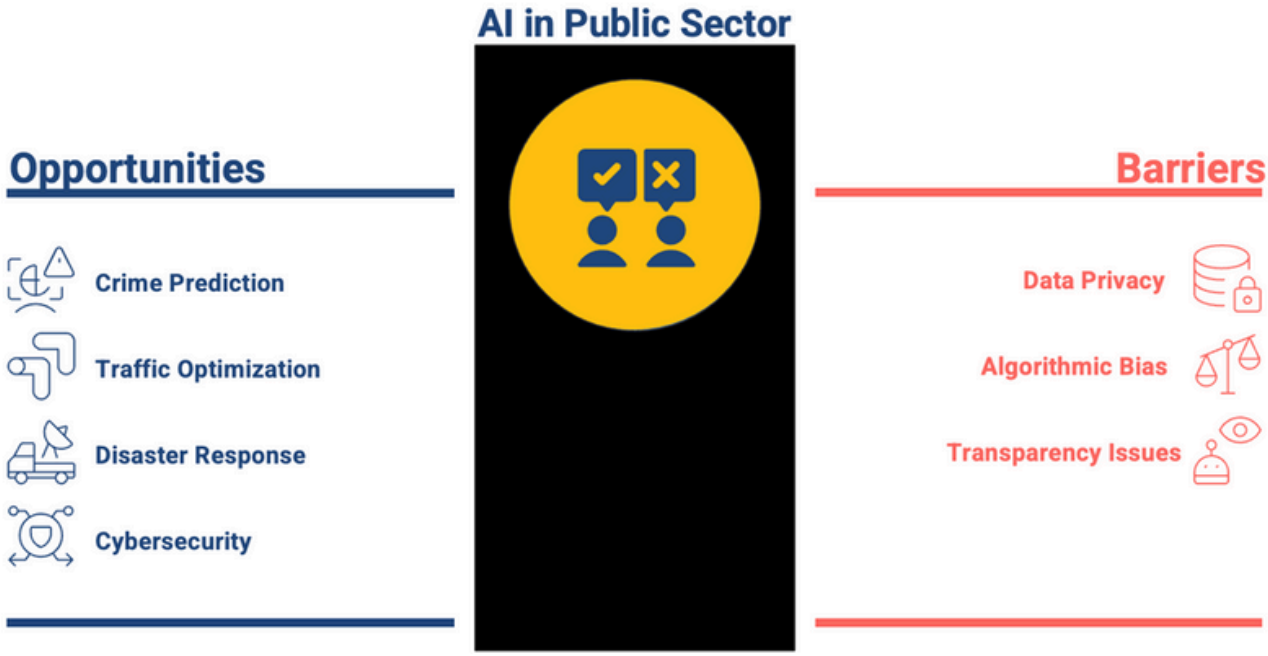
Manufacturing, including automotive, aerospace, and robotics, has been an early adopter of AI for predictive maintenance, quality control, and supply chain optimisation. Where AI systems control machinery that interacts with humans, they are classified as high risk under the Act and the EU Machinery Regulation [64]. Firms such as Siemens, ABB, and Bosch are embedding safety measures into AI by design, ensuring compliance with both regulatory regimes. Digital twins, virtual replicas of processes, are being used to test AI before deployment, reducing risk and regulatory exposure. Collaborative robots (cobots) are another area of focus. Vendors emphasise safety certification as part of their competitive positioning in an increasingly regulated market.



7.4 Public Sector and Security

AI in the public sector faces the highest levels of scrutiny. The AI Act prohibits applications deemed to present "unacceptable risk," including most uses of real-time biometric recognition in public spaces, with limited exceptions [65]. By contrast, applications such as e-government chatbots or AI-based traffic management fall under limited-risk categories and require only basic transparency. Predictive policing, immigration processing, and automated judicial decision-making are high risk, requiring strict oversight and human review.

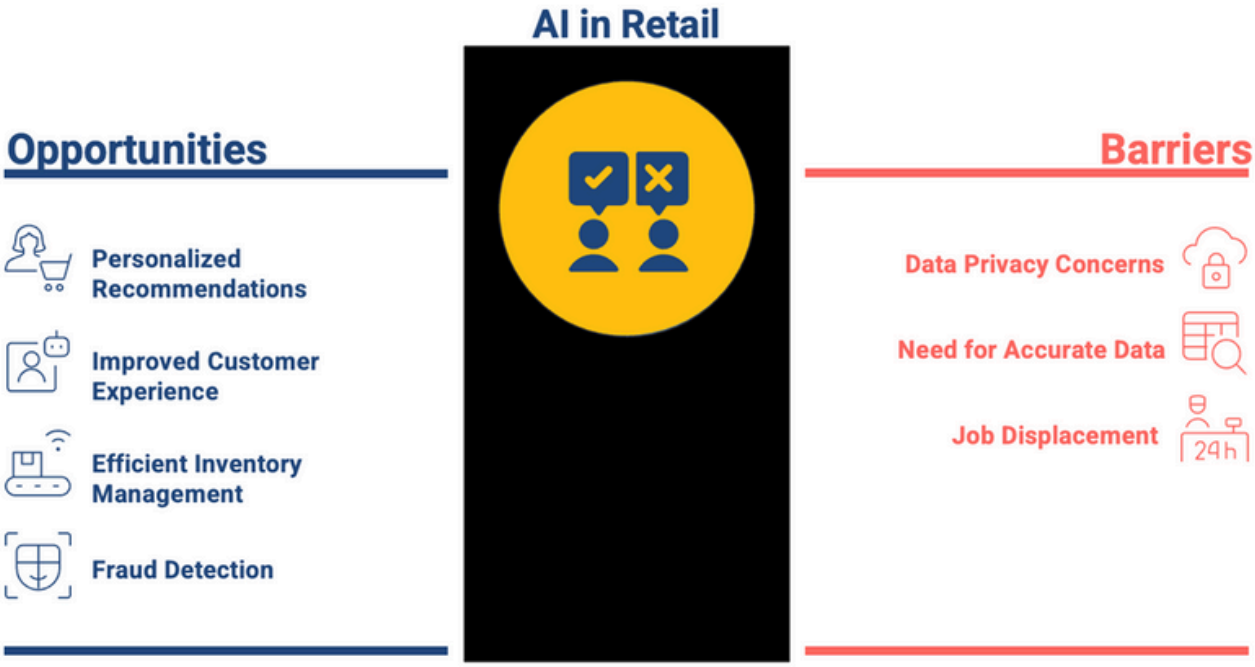
Governments are increasingly engaging AI auditors to certify compliance before deployment. Although defence is partly exempt from the Act, major firms such as Thales and BAE Systems are voluntarily adopting ethics frameworks to align with future expectations.



7.5 Retail and Consumer Services

Retail and consumer services employ AI for personalisation, recommendations, dynamic pricing, and automated customer support. Most uses are low risk, though profiling and targeted marketing raise concerns under GDPR and consumer protection law. The Act requires transparency: chatbots must disclose their automated nature, and AI-generated media, such as deepfake advertisements or synthetic influencers, must be labeled [66].

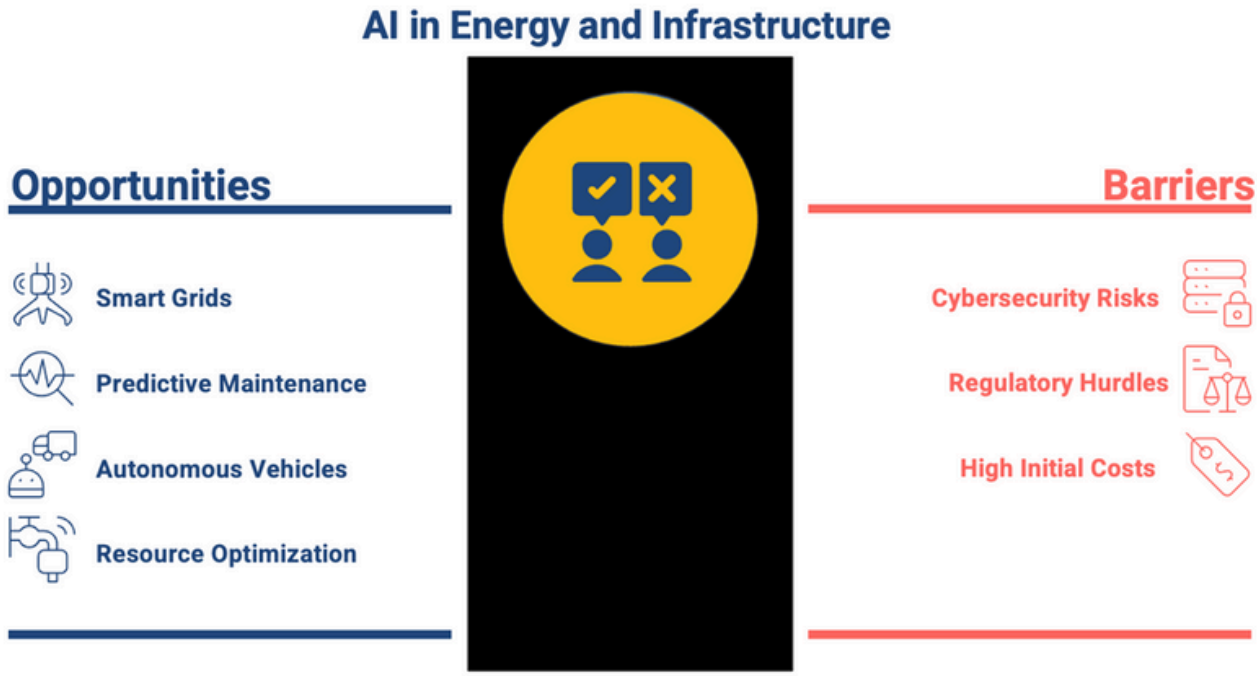
Firms are adjusting user interfaces to meet these requirements, and ethical certification labels are likely to emerge as additional trust signals. The AI Act is thus reshaping the relationship between businesses and consumers by embedding transparency into everyday AI interactions



7.6 Energy and Infrastructure

In energy and infrastructure, AI is used for smart grid management, predictive maintenance, and climate modelling. These applications are increasingly important for sustainability but, when linked to critical infrastructure, fall into the high-risk category. Compliance requires stringent security and reliability measures. Firms are working with regulators and cybersecurity specialists to meet standards.

At the same time, AI is being deployed to improve energy efficiency and enable the green transition. Investment in compliant solutions in this sector highlights how regulation and innovation are intertwined in the EU's approach.



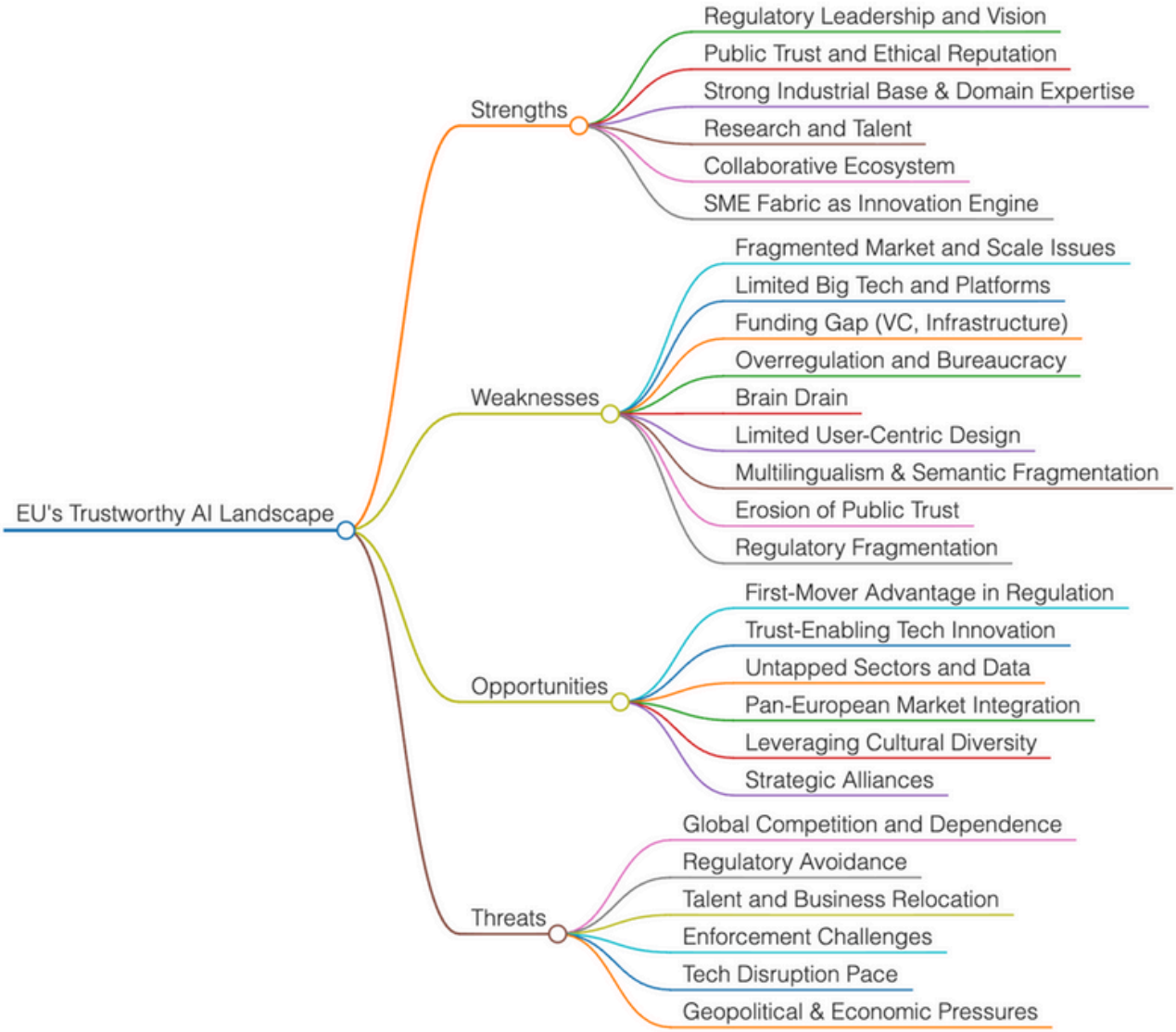
Across all sectors, a consistent pattern is visible: trustworthy AI principles are becoming embedded in standards and practices. For some industries, compliance is a legal obligation; for others, trust is driven by consumer expectations or sectoral guidelines. In either case, neglecting ethical and regulatory dimensions is no longer a viable option. Firms that invest early in certification and transparency are positioned to secure contracts and user acceptance, while those that fail to adapt face reputational and legal risks. Finally, reducing the energy consumption of AI models themselves is a key dimension of trustworthy AI. Techniques such as model compression, pruning, and frugal neural network design reduce computational and energy requirements, limiting the environmental footprint of AI deployments. By prioritising energy-efficient AI, firms uphold the EU's principles of reliability, accountability, and societal benefit, while supporting climate goals, lowering operational costs, and making high-performance models more accessible. Sustainable AI thus reinforces both technological leadership and the broader objectives of trustworthy AI in the EU.

VIII.

COMPETITIVE LANDSCAPE ANALYSIS (SWOT)

The competitive landscape for trustworthy AI in the EU can be analysed in terms of strengths, weaknesses, opportunities, and threats – both for the region as a whole and for major players within it. This SWOT assessment highlights where EU and its companies stand in the global AI market.

The figure depicts the high-level overview of the EU's Trustworthy AI Landscape that is developed in the following sections:



8.1 Strengths

[Regulatory leadership and vision | public trust and ethical reputation | strong industrial base and domain expertise | research and talent as knowledge strength | and collaborative ecosystem]

Regulatory Leadership and Vision

The EU has positioned itself as a global leader in AI regulation, with the AI Act representing the first comprehensive legal framework of its kind. The AI Act introduces requirements for risk management, transparency, and human rights safeguards, setting a precedent for how AI is governed [67]. This proactive stance mitigates risks while also fostering innovation by clarifying expectations for developers and users. As with the General Data Protection Regulation (GDPR), the EU's approach is expected to shape global standards, encouraging international convergence around ethical and safe AI [68]. Firms that adapt early to EU requirements may find themselves better prepared for similar frameworks in other jurisdictions, gaining a strategic advantage in international markets.

Public Trust and Ethical Reputation

European consumers show strong awareness of privacy, security, and ethical considerations, influencing the direction of AI adoption. This sensitivity has encouraged companies to adopt higher levels of transparency and accountability. In finance and healthcare, for example, strict oversight reinforces consumer confidence in AI-based services. Firms that prioritise fairness and safeguard ethical standards benefit from greater user trust, which in turn supports higher adoption rates in regulated industries.

Strong Industrial Base and Domain Expertise

Europe hosts globally competitive industries that are actively integrating AI, including manufacturing, automotive, telecommunications, pharmaceuticals, and industrial automation. Companies such as Siemens, BMW, and Philips combine domain expertise with extensive datasets, enabling the development of AI tailored to specific industrial needs [69,70]. Its long-standing experience in safety-critical sectors, aviation, pharmaceuticals, and infrastructure, provides an advantage for deploying AI in contexts where reliability and compliance are non-negotiable.

Research and Talent

The EU benefits from a highly skilled AI workforce and world-leading research institutions. Initiatives such as the European Laboratory for Learning and Intelligent Systems (ELLIS) and the Confederation of Laboratories for AI Research in Europe (CAIRNE) promote both scientific excellence and collaboration with industry. The EU hosts three of the world's top AI ethics research centres [71,72], underscoring its leadership in governance and explainability. The region's multilingual and culturally diverse environment also supports the development of AI adapted to varied populations, with DeepL's language processing tools serving as a notable example [89].

Collaborative Ecosystem

The EU's AI ecosystem is shaped by strong collaboration between governments, academia, and industry. Public-private partnerships, regulatory sandboxes, and targeted funding programs create structured environments for experimentation. Initiatives such as the EIC, Horizon Europe, and AI Regulatory Sandboxes allow firms to test solutions under regulatory supervision before market launch. This cooperative framework accelerates adoption while ensuring compliance with the AI Act's risk-based classification. It also facilitates the diffusion of best practices, aligning AI innovation with EU's human-centric values.

SMEs as Engines of Innovation

SMEs form the backbone of EU's AI ecosystem, with over 25 million SMEs representing 99% of the EU businesses. Their scale and flexibility make them critical actors in bringing AI into niche applications and local markets. SMEs often act as early adopters, experimenting with several technology enablers that reflect community needs. Their proximity to end users enables them to develop context-sensitive, human-centric AI systems aligned with the principles of the AI Act.

EU instruments such as the Digital Europe Programme, AI Factories, European Digital Innovation Hubs (EDIHs), and regulatory sandboxes are designed to support SME participation. These mechanisms provide access to funding, expertise, and test environments, reducing barriers to entry and fostering responsible experimentation. By combining agility with ethical ambition, SMEs strengthen EU's capacity to scale trustworthy AI while embedding it in socially responsible and regionally inclusive practices. This distributed innovation fabric represents a distinct strategic asset for the EU in the global AI landscape.

8.2 Weaknesses

[Fragmented Market and Scale Issues | Limited Big Tech and Platform Companies | Venture Capital & Funding Gap | Overregulation and Bureaucracy | Brain Drain | Limited Focus on User-Centric Design and Societal Impact Assessment]

Fragmented Market and Scale Issues

The EU remains a fragmented market, divided by language, regulatory divergence, and consumer preferences. AI companies often face the challenge of adapting to 27 separate markets, which increases operational costs and slows scaling. Unlike the U.S. or China, where large, relatively homogeneous markets facilitate rapid growth, EU's heterogeneity weakens the network effects on which AI development depends. Fragmentation also risks duplication of efforts and inefficient resource allocation, further limiting EU's ability to build large-scale AI platforms.

Limited Big Tech and Platform Companies

The EU currently lacks large technology companies of the scale of Google, Amazon, or Tencent. No EU-born firm has exceeded a €100 billion market capitalisation in the past fifty years [73], while the U.S. counts several trillion-dollar players. The absence of such firms means the EU has fewer data-rich and capital-rich actors capable of driving global AI development. Startups often depend on non-European infrastructure, such as U.S.-based cloud services, which reduces EU's control over key AI resources. This dependence also contributes to talent drain, as researchers and engineers are drawn toward regions with stronger platform ecosystems.

Venture Capital and Funding Gap

European AI ventures continue to experience a structural funding gap. The region accounts for only 5% of global venture financing for tech scale-ups [74,75] and about 4% of global AI VC in 2023 [76]. The scarcity of late-stage capital makes it difficult for startups to scale without relocating. The funding gap also extends to infrastructure: training frontier AI models requires significant investment in data centres and chips, areas where the EU is still catching up, hence policy initiatives such as the EU Chips Act. Without adequate resources, European AI projects may proceed more cautiously, or target narrower applications, compared to global competitors.

Overregulation and Bureaucracy

The EU's regulatory approach is often presented as a strength, but it also creates risks. Rules designed to foster trust can become rigid, slowing innovation if implementation is overly bureaucratic. Critics suggest that protective regulation sometimes "offers protection but closes off opportunities" [77]. Strict labour regulations may make it harder for startups to pivot, while complex certification and approval processes under the AI Act could discourage agile experimentation. More broadly, the so-called "innovation valley of death", the difficulty of translating research into commercial products, has been linked to regulatory burdens and risk aversion. If not carefully managed, these dynamics could reduce EU's competitiveness relative to faster-moving ecosystems.

Brain Drain

The EU produces a highly trained AI workforce, yet many researchers and engineers continue to move abroad for higher salaries, better infrastructure, or greater opportunities. The U.S., Canada, and emerging hubs such as Arab countries remain strong magnets for talent. When startups relocate to secure funding, their teams often follow, exacerbating the trend. European initiatives, including research grants, and mobility programs, aim to address this challenge, but retaining talent requires sustained investment in research, infrastructure, and an attractive working environment.

Limited Focus on User-Centric Design and Societal Impact Assessment

Although ethical AI is a strong focus in the EU, systematic approaches to user-centric design and societal impact assessment remain less developed. Insufficient involvement of end-users and affected communities in the design and evaluation of AI systems can result in technologies that do not fully address user needs or that generate unintended social consequences. A stronger emphasis on participatory design, as well as systematic societal impact assessments, would enable European AI developers to create systems that are more effective, equitable, and aligned with social values.

Multilingualism, Multiculturalism, and Semantic Fragmentation

The EU's cultural and linguistic diversity, while often a strength, introduces operational challenges for trustworthy AI. The coexistence of 24 official languages and numerous regional dialects complicates standardisation and creates uneven dataset quality. As a result, models may perform inconsistently across linguistic groups, potentially amplifying inequalities in access to services. A chatbot trained primarily on English and French data, for example, may fail in Romanian or Gaelic contexts.

Cultural heterogeneity further complicates definitions of fairness and transparency, as societal norms vary across member states. Divergent ethical interpretations may lead to uneven implementation of trustworthy AI, hindering the creation of a unified European market. Without sustained investment in multilingual datasets, culturally aware model evaluation, and inclusive design practices, the EU risks undermining its own ambitions. Integrating linguistic and cultural adaptability into governance frameworks will be essential to ensuring that AI systems remain accessible and equitable across the continent.

Regulatory Fragmentation and Enforcement Challenges

The effectiveness of the AI Act will depend on consistent enforcement across member states. Divergent national approaches could lead to uneven compliance requirements, undermining legal certainty for firms operating cross-border. If some countries enforce obligations lightly while others impose stricter interpretations, the result would be a fragmented market. In addition, weak institutional capacity at the European AI Board or national regulators could allow non-compliant systems to enter the market, damaging both trust and the credibility of the governance framework.

Erosion of Public Trust and Acceptance

Despite the EU's emphasis on ethics, AI systems that fail to meet expectations for fairness, transparency, or accountability could trigger public backlash. Perceived bias or discrimination would undermine consumer trust and slow adoption, even in low-risk sectors. Sustained public engagement and demonstrable accountability will be necessary to prevent reputational risks from eroding the broader legitimacy of AI deployment.

8.3 Opportunities

[Setting the Global Standard (First-Mover Advantage in Regulation) | Innovation in Trust-Enabling Technologies | Untapped Sectors and Data | Pan-European AI Market Integration | Collaboration with Like-minded Partners | Dataspaces]

Establishing a Global Standard in AI Regulation

The EU's early adoption of a comprehensive legal framework through the AI Act positions it as a global reference point for AI regulation. By exporting its "trustworthy AI" model, the EU can shape international standards much as it did with the GDPR. Consulting firms and certification bodies specialising in governance and auditing stand to become leaders in ensuring safety and accountability. As other countries adopt frameworks inspired by EU's risk-based approach, demand for EU-designed compliance tools, methodologies, and auditing practices is expected to rise. Companies seeking long-term stability may also choose to base operations in the EU to align with stringent standards, potentially attracting investment and reinforcing EU's influence in shaping global AI markets.

Driving Innovation in Trust-Enabling Technologies

The emphasis on trustworthy AI creates opportunities in technologies that support safety and accountability. Key growth areas include auditing software, bias detection, privacy-preserving methods, and secure hardware such as trust-centric AI chips. European startups active in these fields are well positioned, particularly as international firms seek compliance with high standards. The EU's tradition of open-source development adds another dimension. Initiatives such as OpenGPT-X, backed by EU support, reflect an effort to foster transparent and community-driven alternatives to proprietary AI. Open-source ecosystems can reduce dependence on non-European providers while attracting global contributions aligned with a trust-first approach.

Unlocking Potential in Underutilised Sectors and Data Ecosystems

Several European sectors remain underutilised in terms of AI adoption, offering significant room for growth. Several market sectors, such as public services, healthcare, and agriculture, generate valuable data but have not fully embraced AI efficiencies. As governance frameworks mature, adoption in these domains is likely to accelerate. The European Health Data Space[1] illustrates how secure and interoperable data infrastructures could unlock new possibilities in medical research and personalised care. Similarly, the EU's sustainability agenda aligns AI with applications in climate modelling, energy efficiency, and environmental monitoring. By connecting AI innovation with established European strengths, green technologies, advanced manufacturing, and healthcare, the EU can define niche areas of global leadership.

Pan-European AI Market Integration and Scalability

Integration of national markets remains a prerequisite for achieving scale. Fragmented policies currently hinder cross-border deployment, but initiatives such as Gaia-X and EU-wide data spaces are designed to promote interoperability and seamless deployment. Harmonisation of regulation and infrastructure would allow companies to validate and expand technologies across the EU before competing globally. Financial instruments, including the €134 billion Recovery and Resilience Facility, can help close the adoption gap among member states, expanding the overall size of the European AI market [78,79].

[1] https://www.european-health-data-space.com/

Harnessing the Power of European Values and Cultural Diversity

The EU's diverse cultural and linguistic landscape offers an opportunity to differentiate its AI systems. By embedding inclusivity, equity, and social responsibility into design, European firms can create technologies tailored to varied populations. Projects such as the European Language Equality illustrate how AI can preserve linguistic diversity and broaden accessibility [90]. Cultural diversity also provides a testing ground for systems designed to function across multiple contexts, enhancing adaptability. Framing AI as a human-centric technology rooted in ethical values could help the EU build a distinct global brand.

Strategic Alliances with Like-Minded Partners

The EU's internal ecosystem already includes initiatives such as Z-Inspection®, Confiance.ai, and etami, as well as instruments like AI Regulatory Sandboxes and EIT Digital. These platforms support ethical assessment, explainability, and transparency, while enabling firms to experiment under regulatory supervision. Together, they create an interconnected environment for co-creation of standards and collaborative innovation.

Beyond the EU, alliances with countries committed to ethical AI, such as Japan, Canada, UK, Australia and the Global South, could reinforce EU's position in global governance. Joint research, aligned regulation, and cross-border technology development would strengthen EU's ability to act as a counterweight to the U.S. and China. Attracting global AI talent motivated by a societal and human-centric vision further enhances EU's prospects. Expanding these partnerships would not only broaden the reach of EU's regulatory influence but also open new market channels for trust-based AI solutions.

8.4 Threats

[Intense Global Competition | Regulatory Backlash or Avoidance | Loss of Talent and Companies (Brain & Business Drain) | Fragmentation in Implementation | Technological Disruption and Pace | Economic and Geopolitical Pressures]

The global AI market is dominated by the U.S. and China, whose firms benefit from superior financial resources, advanced computing infrastructure, and vast data reserves. Their platforms and foundation models increasingly set industry benchmarks. European firms risk becoming primarily consumers of foreign technologies rather than independent developers, creating a dependence that undermines strategic autonomy. The consolidation of cloud infrastructure and AI application platforms under non-European control could restrict European companies' ability to scale competitively and may subject them to unfavourable contractual conditions.

Regulatory Burdens and Market Avoidance

While the AI Act provides a framework for trustworthy AI, there is a risk that excessive compliance requirements will deter investment. Businesses, particularly non-European providers, may limit their presence in the EU or restrict advanced functionalities to other regions, a dynamic sometimes described as "innovation flight." Delayed access to AI-driven medical tools or generative models could make the EU a secondary market, reducing competitiveness. Inconsistent enforcement across member states may exacerbate this risk by creating a fragmented regulatory landscape that discourages cross-border investment.

Loss of AI Talent and Startup Relocation

The EU continues to face a persistent outflow of AI talent. Researchers and entrepreneurs are drawn to ecosystems in North America or Asia that offer more favourable funding, faster scaling opportunities, and higher salaries. The Draghi report highlights that structural investment gaps and regulatory barriers have already driven several European unicorns to relocate headquarters abroad [80,81]. If these trends persist, the EU may remain strong in research and education but fail to capture economic value, effectively acting as a "workshop" for others' AI-driven growth.

Technological Disruption and the Pace of AI Advancements

AI capabilities are evolving faster than regulatory frameworks can adapt. General-purpose models can be repurposed unpredictably, raising the possibility that malicious applications, ranging from cyberattacks to disinformation campaigns, emerge before safeguards are in place. The misuse of deepfakes to influence democratic processes illustrates this challenge. Europe risks falling behind if a breakthrough, such as artificial general intelligence (AGI), occurs outside the region, given its more limited compute and funding base. Agility in policymaking will be essential to avoid regulatory obsolescence.

Economic and Geopolitical Pressures

External economic shocks or geopolitical conflicts could constrain EU's AI strategy. Restrictions on semiconductor exports, for example, could limit access to AI-critical hardware. Economic downturns could reduce available funding for AI research and innovation. Diverging regulatory philosophies may also create trade tensions: strict EU standards could discourage foreign investment or provoke retaliatory measures. Balancing innovation incentives with regulatory integrity in this context will be a persistent challenge.

Strategic Risks and the Need for Adaptive Policy

The EU's long-term position depends on its capacity to adapt to these risks. Coordinated policies must balance compliance with competitiveness, ensuring that regulatory rigor does not become a barrier to market growth. Success will hinge on attracting and retaining talent, mobilising investment at scale, and maintaining resilience in the face of technological and geopolitical disruptions. Strategic alliances with like-minded partners will be key to reinforcing EU's influence while mitigating vulnerabilities.

IX.

CONCLUSIONS

The EU's AI market stands at a strategic turning point, shaped by the interplay of regulation, innovation, investment, and global competition. The continent's ambition to establish itself as a leader in trustworthy AI has already given it a distinctive role in the international landscape, with the AI Act serving as the first comprehensive framework for risk-based AI regulation. Much like the GDPR reshaped global data protection, this initiative positions the EU as a potential global standard-setter. Yet whether such regulatory leadership can be transformed into sustainable economic and technological advantage remains uncertain.

On the one hand, EU's emphasis on trust, ethics, and accountability provides it with a compelling value proposition. The clarity of the AI Act offers firms the chance to gain first-mover advantages, positioning themselves as global reference points for AI transparency and reliability. Long-standing expertise in safety-critical sectors such as healthcare, manufacturing, and finance reinforces this trajectory, as these industries already demand the kind of reliability and oversight that align naturally with the EU's regulatory model. If effectively leveraged, these strengths could anchor an ecosystem capable of both attracting investment and exporting governance approaches worldwide.

On the other hand, structural weaknesses persist. The European market remains fragmented by language, regulation, and consumer preferences, limiting economies of scale. The absence of homegrown platform companies of the scale of U.S. or Chinese giants reduces EU's influence over global AI infrastructure and standards, while late-stage funding shortages push promising startups abroad. Moreover, Europeans have historically shown a low willingness to pay for software, valuing 'free' digital services even when the hidden privacy risks embedded in opaque business models ultimately undermine user trust. Talent continues to follow, drawn to more favourable ecosystems in North America and Asia, creating the risk that the EU becomes a hub of research and early-stage innovation without capturing the full economic benefits. Regulatory complexity may compound these problems if compliance complexity proves especially heavy for SMEs, reinforcing barriers rather than lowering them.

Despite these constraints, opportunities are opening in areas where trust can become a differentiator. AI assurance services, compliance tools, open-source models, and bias detection technologies are emerging as growth fields in which European actors can take a leading role. Under-digitised sectors such as public services, healthcare, and agriculture represent further spaces where adoption could accelerate once governance frameworks mature, and trust is consolidated. Initiatives such as Gaia-X, EU data spaces, AI Factories, and regulatory sandboxes, if scaled effectively, may help overcome fragmentation, enabling firms to validate and expand technologies across borders. Even cultural and linguistic diversity, often seen as a barrier, could become an asset if systematically integrated into data strategies and system design, giving the EU an advantage in building AI systems robust across different contexts.

At the same time, threats loom large. Competition from the U.S. and China risks relegating the EU to the role of consumer rather than producer of frontier AI. Confusing, incoherent or uncertain regulation could encourage innovation flight, as firms' geo-fence their most advanced offerings outside of the EU. Persistent talent relocation and startup headquarters shifts reflect these dynamics, while geopolitical tensions around semiconductors and cloud infrastructure expose EU's dependence on external providers for critical resources. Finally, if AI systems deployed in the EU fail to meet public expectations for fairness, safety, or transparency, the erosion of trust could undermine adoption, even in areas where regulation is more robust.

The path forward will therefore require a careful balance. To ensure that regulation functions as an enabler rather than a constraint, the EU will need to facilitate compliance for smaller firms, mobilise capital to bridge the funding gap, and accelerate the deployment of compute and data infrastructure. The EU should tighten oversight of dominant market actors to prevent lock-in and ensure fair competition, while creating a more enabling environment for smaller European companies. When companies integrate ethics, safety, and transparency as core principles, they not only reduce reputational and regulatory risks but also create a clear market advantage. Communicating this deliberately encourages widespread adoption of responsible AI practices, positioning the EU as a leader in innovation that is both sustainable and socially trusted.

Strategic alliances with partners that share the EU's values and regulatory principles, such as Japan, Canada, the UK, Australia and the Global South, can expand EU's influence and market reach if paired with harmonised standards and research and innovation joint efforts, while internal investments in multilingual and multicultural datasets, inclusive design practices, supporting innovation schemes for shared AI resources, and participatory governance will be necessary to ensure equitable access across the Union. If these measures are pursued decisively, the EU can align its ethical commitments with technological progress, positioning itself as both a regulatory leader and an innovation hub.

The strategic outlook, then, is one of conditional opportunity. The EU has the tools to shape not only its own AI trajectory but also the global direction of AI governance. The decisive factor will be whether it can effectively reinforce the message that trust, and ethics strengthen competitiveness rather than hold it back, creating a model where responsible AI developments become an engine for both innovation and sustainable growth.

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BDV BIG DATA VALUE ASSOCIATION

BDVA is an industry-driven international not-for-profit organisation with 250 members all over Europe and a well-balanced composition of large, small and medium-sized industries, start-ups as well as research and user organisations. Our mission and objectives are:

- To boost Data and AI research, development and innovation for European competitiveness, societal wellbeing and sustainable progress
- To develop the innovation ecosystem that enables and accelerates the data-driven and AI-enabled digital transformation of the economy and society, with European values and focus but global impact and ambitions.
- To foster excellence in European Data and AI research, in science and business.
- To anticipate, lead and keep up with the dynamic change that Data and AI brings to business and society.

BDVA enables existing regional multi-partner cooperation, to collaborate at the European level through the provision of tools and know-how to support the cocreation, development and experimentation of pan-European data-driven and AI applications and services and know-how exchange. Through BDVA, its Task Forces and labelled hubs (i-Spaces), our members build new collaborations, co-create new projects, share knowledge and jointly develop guidelines, frameworks and strategic roadmaps for industry and policymakers.
Together with our members and our collaboration partners, we advance all related areas connected to the data economy such as data spaces, data privacy, industrial and ethical AI, generative AI, business models, standardisation, skills, computing and many others. BDVA is contributing to all these discussions, having significant impact, developing relevant collaborations and with a very well-established community of members that are at the core of the European data and AI ecosystems!
BDVA is a private member of the EuroHPC Joint Undertaking and it is a founder member of the AI, Data and Robotics Partnership. BDVA has developed a strong and growing cooperation with Gaia-X, IDSA and FIWARE through the Data Spaces Business Alliance (DSBA) and collaborates with many data and industry-driven AI national initiatives and other European communities.
In October 2024 the BDVA community celebrates the Association's 10th anniversary, that keeps on growing in breadth and in depth thanks to our members, our team and our collaboration partners. Join us in the celebration!

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